

**CALFED BAY-DELTA PROGRAM  
TECHNICAL SERVICES BRANCH**

**DRAFT**

**STORAGE AND CONVEYANCE  
COMPONENT COST ESTIMATES**

**APRIL 29, 1998**



**CALFED  
BAY-DELTA  
PROGRAM**

# **CALFED BAY-DELTA PROGRAM**

## **Office Memorandum**

**Date:** April 29, 1998

**To:** Dave Samson

**From:** Paul Massera

**Subject:** Storage and Conveyance Component Cost Estimates

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Per your request, a report has been prepared that summarizes the preliminary cost estimates for the alternative configurations portrayed in Phase II of the CALFED Bay-Delta Program. The facilities included in these alternative configurations are detailed in the Programmatic EIR/EIS Technical Appendix – Project Alternatives, dated March 1998. Specifically, this report includes:

- Base Construction Estimates
- Total Capital Costs
- Annual Cost Analysis
- Alternative Costs (1A, 1B, 1C, 2A, 2B, 2D, 2E, 3A, 3B, 3E, 3H, 3I)

cc: Mark Cowin

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**CALFED BAY-DELTA PROGRAM  
STORAGE AND CONVEYANCE COMPONENT COST ESTIMATES**

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## I INTRODUCTION

The objective of this technical memorandum is to summarize the preliminary cost estimates of the facilities that comprise the alternative configurations described in the Programmatic EIR/EIS Technical Appendix – Project Alternatives, dated March 1998. Further refinement to this inventory will take place through Phase II.

Each alternative configuration is comprised of various facility components. Component classifications generally fall into two categories; storage and Delta conveyance. Included in storage are surface storage reservoirs, major reservoir conveyance facilities, and groundwater storage projects. Delta conveyance includes north Delta improvements, south Delta improvements, Central Valley Project and State Water Project improvements, isolated facility, and in-Delta storage. In addition to various storage and conveyance components being considered in each CALFED alternative are the Common Programs. At the time of this report, detailed component costs for the Common Programs had not been developed. The estimate for the Common Programs (Water Use Efficiency, Water Transfers, Water Quality, Upper Watershed Management, Levee Integrity, and Ecosystem Restoration) is only a placeholder at this time, and represents an order of magnitude that may be anticipated for the programs.

The inventory of costs include detailed construction estimates of the component facilities, development of total capital and total annual costs, and comprehensive cost summaries of the twelve CALFED alternative configurations (1A, 1B, 1C, 2A, 2B, 2D, 2E, 3A, 3B, 3E, 3H, 3I). Note that cost estimates for the five dropped alternatives (2C, 3C, 3D, 3F, and 3G) are not included in this document due to their elimination early in the Phase II process. The total capital and total annual costs estimated to implement each of the alternatives are summarized in Table G.

## II BASE CONSTRUCTION ESTIMATES

Itemized costs were developed for all potential facility components. The summary of each component represents the base construction estimate which in turn is used as the basis for

developing the capital cost. All CALFED base construction estimates have been adjusted to 1996 dollars. Appendix A contains all base construction estimates for surface storage facilities. Likewise, Appendices B, C, and D contain base construction estimates for major reservoir conveyance facilities, Delta conveyance facilities, and groundwater storage projects, respectively.

Base construction estimates for the Common Programs were not developed. Instead, lump sum costs were assumed for each program at the alternative level. These estimates are presented in the *Alternative Costs* section of this report. Similarly, base construction estimates were not developed for the representative facilities as they were built from the estimates of the specific facilities. Estimated costs for the representative facilities are also presented in the *Alternative Costs* section.

### **III CAPITAL COST AND ANNUAL COST ANALYSES**

#### **A. Capital Cost Development**

##### **1. Contingencies, Engineering, and Regulatory Costs**

The base construction estimate increased by 20 percent contingencies is the construction cost of that component. Engineering cost is represented as 35 percent of the construction cost and includes planning, design, construction administration, and legal costs. Similarly, regulatory cost was estimated at 20 percent of the construction cost. The Foregone Investment Value (FIV) of the component was then calculated based on the construction estimate, engineering, and regulatory costs.

##### **2. Forgone Investment Value**

The Forgone Investment Value, sometimes referred to as Interest During Construction, is typically considered in estimating the total capital cost of a proposed project. The facility cost estimates were adjusted to correspond to the end of the final year of construction: the year immediately prior to the beginning of the period of operation, when project benefits begin to accrue. This adjustment is necessary because construction of major facilities occurs over a

period of years. Throughout the construction period funds are withdrawn from the economy to support the construction process. These allocated funds are therefore not available for alternative investment opportunities that would provide net economic returns throughout the construction period. The true economic cost of the project includes both the direct construction cost and the alternative investment returns, which are foregone by investing in the water project. A discount rate of 6 percent was assumed for this adjustment.

A construction period of five years was assumed for reservoir facilities as well as Delta conveyance facilities. The following cost allocation scenario was developed for these facilities:

#### **Cost Allocation for Proposed Surface Storage and Delta Conveyance facilities**

YEAR <sup>1</sup>	COST ALLOCATION
0	20 %
1	20 %
2	25 %
3	25 %
4	10 %

(1) Year 0 designates the first year of construction.

Similarly, a construction period of two years was assumed for all major reservoir conveyance and groundwater project facilities. The following cost allocation scenario was developed for these facilities:

#### **Cost Allocation for Proposed Reservoir Conveyance and Groundwater Storage facilities**

YEAR <sup>1</sup>	COST ALLOCATION
0	50 %
1	50 %

(1) Year 0 designates the first year of construction.

Based on these assumptions, this adjustment increases the cost of the reservoirs and Delta conveyance facilities by approximately 14 percent. Likewise, this adjustment increases the cost of the major reservoir conveyance and groundwater facilities by 3 percent. This adjustment was applied to all CALFED cost estimates.

## B. Annual Cost Development

The annual cost is the sum of two elements: (1) the equivalent uniform annual cost; and (2) the recurring annual costs. The first element includes the capital repayment costs (amortized total capital cost). The second element includes operation and maintenance costs as well as energy costs incurred during project operation. Given the uncertainty in the total capital cost of the common program, an annual cost analysis was not performed for the common programs. The common program annual costs presented in this report are the total capital costs divided by the 30-year program life.

### 1. Capital Repayment

Annualized capital repayment costs were developed for each of the proposed facility components. This is based on the total capital costs amortized over a fifty-year period with an assumed interest rate of 6 percent..

### 2. O&M and Energy Costs

The annual operation and maintenance cost was assumed to be 1.5 percent of the total construction cost of the component facility. Similarly, the annual energy cost was assumed to be 0.5 percent of the total construction cost.

The summary of all calculated costs used to generate the Total Capital Costs and Total Annual Costs can be found in Table E.

## IV REPRESENTATIVE FACILITIES

Several CALFED alternatives include the development of surface and groundwater storage as part of the solution. Representative facility costs were created as a means of

displaying what storage may cost in the absence of identifying specific facility locations. The representative storage costs were developed by averaging the estimated unit costs (capital cost/acre-foot of storage) of prospective facilities within each of the proposed regions being considered for storage. The average unit cost was then used to generate a representative cost for the volume of storage being considered within each respective region. Appendix F illustrates the development of the representative surface and groundwater storage costs.

The volume of representative storage being considered is as follows:

- Up to 3.0 MAF of tributary surface storage in the Sacramento Valley
- Up to 250 TAF of groundwater storage in the Sacramento Valley
- Up to 240 TAF of tributary surface storage in the San Joaquin valley
- Up to 500 TAF of groundwater storage in the San Joaquin Valley
- Up to 1.0 MAF of off-Aqueduct storage South of the Delta
- Up to 2.0 MAF of off-Aqueduct storage South of the Delta.

## V CALFED ALTERNATIVE COSTS

The Alternative Cost Summaries include Total Capital and Total Annual Costs as well as brief facility component descriptions (See Appendix G). The estimated capital costs range from \$4.0 billion for Alternative 1A (Existing System Conveyance) to \$14.8 billion for Alternative 3I (Dual Delta Conveyance). Similarly, the estimated annual costs range from \$133 million to \$945 million, respective to the same alternatives. A summary of the total capital and total annual costs required to implement the proposed alternatives is presented on Table G.

A cost range was included on each Alternative Preliminary Cost Summary sheet. The low-end of the cost range is the total capital cost minus 10 percent. The high-end of the cost range is the total capital cost plus 15 percent. This cost range is displayed below the Total Cost item on the Preliminary Cost Summary sheets in Appendix G.

## **APPENDIX A**

### **SURFACE STORAGE FACILITY COMPONENTS**

### **BASE CONSTRUCTION ESTIMATES**

**SURFACE STORAGE FACILITIES**

DESCRIPTION	PAGE
COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE	A 1.1 - A 1.5
RED BANK PROJECT	A 2.1 - A 2.5
SITES RESERVOIR - 1.2 MAF ALTERNATIVE	A 3.1 - A 3.3
SITES RESERVOIR - 1.9 MAF ALTERNATIVE	A 4.1 - A 4.3
THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE	A 5.1 - A 5.5
MONTGOMERY RESERVOIR	A 6.1 - A 6.2
LOS BANOS GRANDES RESERVOIR - 2.03 MAF ALTERNATIVE	A 7.1 - A 7.2
LOS VAQUEROS RESERVOIR ENLARGEMENT	A 8.1 - A 8.5

**TABLE A****APPENDIX A**

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$916,630,580  
Revision Date: October-96

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRC033

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
I.	<b>RIGHTS-OF-WAY</b>				
	Colusa Reservoir (Includes Buffer Area Factor of 1.32)	AC	\$ 1,500	39,072	\$ 58,608,000
	Logan Canal (1.7 Miles by 350 Feet Wide)	AC	\$ 1,500	72	\$ 108,000
	Logan Forebay (Includes Buffer Area Factor of 1.32)	AC	\$ 1,500	68	\$ 102,000
		Subtotal			\$ 58,818,000
II.	<b>RELOCATION OF EXISTING PROPERTY</b>				
	Secondary Road Relocation	LS	\$ 31,672,000	JOB	\$ 31,672,000
	12 kV Electrical Line	LS	\$ 1,046,000	JOB	\$ 1,046,000
		Subtotal			\$ 32,718,000
III.	<b>CLEARING RESERVOIR</b>				
	Reservoir clearing	AC	\$ 1,097	1,345	\$ 1,475,721
		Subtotal			\$ 1,475,721
IV.	<b>ACCESS ROADS</b>				
	Access roads	LS	\$ 6,068,000	JOB	\$ 6,068,000
		Subtotal			\$ 6,068,000
V.	<b>GOLDEN GATE DAM - Earth and Rockfill Structure; Crest Elevation 541.3</b>				
	Total Embankment Volume	CY		8,255,200	
	Excavation, all classes for foundation	CY	\$ 3.23	468,000	\$ 1,511,640
	Stripping borrow pits	CY	\$ 1.15	319,000	\$ 366,850
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	3,185,000	\$ 10,255,700
	Excavation, rockfines and hauling to dam (borrow)	CY	\$ 7.15	1,227,500	\$ 8,782,114
	Excavation, rock and hauling to dam (borrow)	CY	\$ 7.15	2,799,000	\$ 20,025,366
	Placing impervious	CY	\$ 0.95	2,722,000	\$ 2,585,900
	Placing rockfines	CY	\$ 0.75	1,534,400	\$ 1,150,800
	Placing rock	CY	\$ 0.75	3,998,800	\$ 2,999,100
	F&P sand filter and gravel drain	CY	\$ 8.54	145,300	\$ 1,240,862
	Grouting foundation	LS	\$ 598,114	JOB	\$ 598,114
	Drains	LF	\$ 11.09	2,790	\$ 30,940
	Gravel on crest	CY	\$ 11.09	2,066	\$ 22,911
	10% minor items	LS		JOB	\$ 4,957,030
		Subtotal			\$ 54,527,325
VI.	<b>SITES DAM - Earthfill and Rockfill Structure; Crest Elevation 541.3</b>				
	Total Embankment Volume	CY		3,631,000	
	Diversion and care of river	LS	\$ 238,464	JOB	\$ 238,464
	Excavation for equalizing channel and fill in coffer dams	CY	\$ 3.58	183,000	\$ 654,634
	Excavation, all classes for foundation	CY	\$ 3.23	209,300	\$ 676,039
	Stripping borrow pits	CY	\$ 1.15	167,000	\$ 192,050
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	1,666,000	\$ 5,364,520
	Excavation, rockfines and hauling to dam (borrow)	CY	\$ 7.15	470,100	\$ 3,363,317
	Excavation, rock and hauling to dam (borrow)	CY	\$ 7.15	1,133,600	\$ 8,110,309
	Placing impervious	CY	\$ 0.95	1,424,000	\$ 1,352,800
	Placing rockfines	CY	\$ 0.75	587,600	\$ 440,700
	Placing rock	CY	\$ 0.75	1,619,400	\$ 1,214,550

### APPENDIX A 1.1

## Description:

COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE

**FACILITY GROUPING: STORAGE  
CODE: BRC033**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
	F&P sand filters and gravel drains	CY	\$ 8.54	128,600	\$ 1,098,244
	Grouting foundation	LS	\$ 237,528	JOB	\$ 237,528
	Drains	LF	\$ 18.24	2,350	\$ 42,873
	Gravel on crest	CY	\$ 12.88	730	\$ 9,401
	10% Minor items	LS		JOB	\$ 2,299,543
	<b>Subtotal</b>				<b>\$ 25,294,973</b>
<b>VII.</b>	<b>HUNTERS DAM - Earthfill and Rockfill Structure; Crest Elevation 541.3</b>				
	Total Embankment Volume	CY		37,500,000	
	Excavation, all classes for foundation	CY	\$ 3.23	2,125,933	\$ 6,866,763
	Stripping borrow pits	CY	\$ 1.15	1,449,087	\$ 1,666,450
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	14,468,153	\$ 46,587,454
	Excavation, rockfines and hauling to dam (borrow)	CY	\$ 7.15	5,576,031	\$ 39,893,554
	Excavation, rock and hauling to dam (borrow)	CY	\$ 7.15	12,714,713	\$ 90,967,053
	Placing impervious	CY	\$ 0.95	12,364,934	\$ 11,746,687
	Placing rockfines	CY	\$ 0.75	6,970,152	\$ 5,227,614
	Placing rock	CY	\$ 0.75	18,164,914	\$ 13,623,686
	F&P sand filter and gravel drain	CY	\$ 8.54	660,039	\$ 5,636,729
	Grouting foundation	LS	\$ 2,716,987	JOB	\$ 2,716,987
	Drains	LF	\$ 11.09	12,674	\$ 140,546
	Gravel on crest	CY	\$ 11.09	9,385	\$ 104,074
	10% minor items	LS		JOB	\$ 22,517,760
	<b>Subtotal</b>				<b>\$ 247,695,356</b>
<b>VIII.</b>	<b>LOGAN DAM - Earthfill and Rockfill Structure; Crest Elevation 541.3</b>				
	Total Embankment Volume	CY		24,300,000	
	Excavation, all classes for foundation	CY	\$ 3.23	1,377,604	\$ 4,449,662
	Stripping borrow pits	CY	\$ 1.15	939,008	\$ 1,079,859
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	9,375,363	\$ 30,188,670
	Excavation, rockfines and hauling to dam (borrow)	CY	\$ 7.15	3,613,268	\$ 25,851,023
	Excavation, rock and hauling to dam (borrow)	CY	\$ 7.15	8,239,134	\$ 58,946,651
	Placing impervious	CY	\$ 0.95	8,012,477	\$ 7,611,853
	Placing rockfines	CY	\$ 0.75	4,516,659	\$ 3,387,494
	Placing rock	CY	\$ 0.75	11,770,864	\$ 8,828,148
	F&P sand filter and gravel drain	CY	\$ 8.54	427,705	\$ 3,652,600
	Grouting foundation	LS	\$ 1,760,607	JOB	\$ 1,760,607
	Drains	LF	\$ 11.09	8,213	\$ 91,074
	Gravel on crest	CY	\$ 11.09	6,081	\$ 67,440
	10% minor items	LS		JOB	\$ 14,591,508
	<b>Subtotal</b>				<b>\$ 160,506,591</b>
<b>IX.</b>	<b>DIKES</b>				
	Total Embankment Volume	CY		2,470,200	
	Excavation, all classes for foundation	CY	\$ 3.23	187,065	\$ 604,221
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	1,428,326	\$ 4,599,209
	Excavation, sand, gravel and hauling to dam (borrow)	CY	\$ 9.52	336,648	\$ 3,203,359
	Excavation, rock and hauling to dam (borrow)	CY	\$ 9.52	579,937	\$ 5,518,363
	Placing impervious	CY	\$ 0.95	1,220,784	\$ 1,159,745
	Placing rockfines	CY	\$ 0.75	420,810	\$ 315,608
	Placing rock	CY	\$ 0.75	828,606	\$ 621,454
	F&P riprap	CY	\$ 31.64	58,896	\$ 1,863,472
	F&P filter blanket	CY	\$ 8.54	174,953	\$ 1,494,098
	F&P bedding for riprap	CY	\$ 11.79	29,465	\$ 347,397
	Grouting foundation	LS	\$ 282,072	JOB	\$ 282,072
	10% Minor items	LS		JOB	\$ 2,000,900

## APPENDIX A 1.2

Description:

COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRCO33

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
Subtotal					\$ 20,008,999
X.	<b>SPILLWAY</b>				
	Excavation, open cut, all classes	CY	\$ 4.03	8,557	\$ 34,485
	Backfill	CY	\$ 8.17	1,200	\$ 9,804
	Special compacted backfill	CY	\$ 13.51	300	\$ 4,054
	Structural Concrete in floors and crest	CY	\$ 365.00	485	\$ 177,025
	Structural Concrete in walls	CY	\$ 365.00	479	\$ 174,835
	Drilling and grouting anchors	LF	\$ 16.86	2,260	\$ 38,095
	F&I 4" dia. S.P. drains	LF	\$ 16.86	180	\$ 3,034
	Riprap	CY	\$ 31.64	200	\$ 6,328
	Bedding for riprap	CY	\$ 11.79	100	\$ 1,179
	F&I 6" dia. S.P. drains	LF	\$ 16.86	700	\$ 11,799
	10% Minor items	LS		JOB	\$ 46,064
	Subtotal				
	Increase spillway capacity from 250cfs to 2,500cfs				
	Cost Factor = (2,500/250)3/8 = 2.371				
	Subtotal				
					\$ 1,201,391
XI.	<b>OUTLET WORKS AT GOLDEN GATE DAM</b>				
	Excavation all classes tailrace	CY	\$ 7.40	36,000	\$ 266,513
	Excavation, open cut	CY	\$ 3.38	6,000	\$ 20,280
	Excavation, tunnel	CY	\$ 128.00	9,700	\$ 1,241,600
	Excavation, gate chamber and shaft	CY	\$ 147.00	6,300	\$ 926,100
	Drilling grout holes	LF	\$ 18.70	13,400	\$ 250,580
	F&I grout pipe and fittings	LB	\$ 4.59	6,700	\$ 30,731
	Hookups to grout holes	EA	\$ 91.73	446	\$ 40,914
	Pressure grouting	SKS	\$ 91.73	13,400	\$ 1,229,241
	Concrete in tunnel lining	CY	\$ 321.00	7,240	\$ 2,324,040
	Structural Concrete in intake	CY	\$ 340.00	3,950	\$ 1,343,000
	Structural Concrete in gate chamber and shaft	CY	\$ 340.00	3,110	\$ 1,057,400
	Structural Concrete in stilling basin	CY	\$ 340.00	3,850	\$ 1,309,000
	Structural Concrete in anchor blocks	CY	\$ 256.00	3,000	\$ 768,000
	Metal control house	LS	\$ 9,173	JOB	\$ 9,173
	Specially compacted backfill	CY	\$ 15.61	800	\$ 12,489
	F&I 11x11 fixed wheel gates	LB	\$ 5.55	116,000	\$ 644,072
	2-42" H.J. valves and controls	LB	\$ 6.28	32,222	\$ 202,243
	2 guard gates for 42" H.J. valves	LB	\$ 6.92	32,000	\$ 221,450
	4-6.5' x8.0' H.P. gates	LB	\$ 4.59	564,000	\$ 2,586,909
	144" dia. penstock & manifold for H.P. gates	LB	\$ 1.65	2,000,000	\$ 3,300,000
	F&I tunnel supports	LB	\$ 3.66	288,000	\$ 1,054,080
	Trashrack metalwork	LB	\$ 3.63	74,000	\$ 268,620
	F&I tower bulkhead	LB	\$ 3.02	100,000	\$ 302,000
	Tunnel vent system	LS	\$ 129,555	JOB	\$ 129,555
	Other misc. metalwork	LB	\$ 3.63	3,000	\$ 10,890
	Rockbolts	LF	\$ 64.14	27,900	\$ 1,789,506
	Chain link fabric	SF	\$ 12.88	23,000	\$ 296,125
	10% Minor items	LS		JOB	\$ 2,163,451
	Subtotal				
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works capacity from 2,100cfs to 22,000cfs				
	Cost Factor = (22,000/2100)3/8 = 2.413				
	OUTLET WORKS COST AT GOLDEN GATE DAM				
XII.	<b>OUTLET WORKS AT LOGAN DAM</b>				
	Excavation all classes tailrace	CY	\$ 7.40	36,000	\$ 266,513

APPENDIX A 1.3

Description:

**COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE**
**FACILITY GROUPING: STORAGE**  
**CODE: BRC033**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
	Excavation, open cut	CY	\$ 3.38	6,000	\$ 20,280
	Excavation, tunnel	CY	\$ 128.00	8,440	\$ 1,080,320
	Excavation, gate chamber and shaft	CY	\$ 147.00	6,300	\$ 926,100
	Drilling grout holes	LF	\$ 18.70	11,700	\$ 218,790
	F&I grout pipe and fittings	LB	\$ 4.59	5,800	\$ 26,603
	Hookups to grout holes	EA	\$ 91.73	388	\$ 35,593
	Pressure grouting	SKS	\$ 91.73	11,700	\$ 1,073,292
	Concrete in tunnel lining	CY	\$ 321	6,300	\$ 2,022,300
	Structural Concrete in intake	CY	\$ 340	3,950	\$ 1,343,000
	Structural Concrete in gate chamber and shaft	CY	\$ 340	3,110	\$ 1,057,400
	Structural Concrete in stilling basin	CY	\$ 340	3,850	\$ 1,309,000
	Structural Concrete in anchor blocks	CY	\$ 256	3,000	\$ 768,000
	Metal control house	LS	\$ 9,173	JOB	\$ 9,173
	Specially compacted backfill	CY	\$ 15.61	800	\$ 12,489
	F&I 11x11 fixed wheel gates	LB	\$ 5.55	116,000	\$ 644,072
	2-42" H.J. valves and controls	LB	\$ 6.28	32,222	\$ 202,243
	2 guard gates for 42" H.J. valves	LB	\$ 6.92	32,000	\$ 221,450
	4-6.5'x8.0' H.P. gates	LB	\$ 4.59	564,000	\$ 2,586,909
	144" dia. penstock & manifold for H.P. gates	LB	\$ 1.65	1,740,000	\$ 2,871,000
	F&I tunnel supports	LB	\$ 3.66	250,600	\$ 917,196
	Trashrack metalwork	LB	\$ 3.63	74,000	\$ 268,620
	F&I tower bulkhead	LB	\$ 3.02	100,000	\$ 302,000
	Tunnel vent system	LS	\$ 112,656	JOB	\$ 112,656
	Other misc. metalwork	LB	\$ 3.63	3,000	\$ 10,890
	Rockbolts	LF	\$ 64.14	24,300	\$ 1,558,602
	Chain link fabric	SF	\$ 12.88	23,000	\$ 296,125
	10% Minor items	LS		JOB	\$ 2,016,062
	Subtotal				\$ 22,176,678
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works capacity from 2,100cfs to 22,000cfs				
	Cost Factor = (22,000/2100)3/8 = 2.413			2.413	
	OUTLET WORKS COST AT LOGAN DAM				\$ 53,512,325
XIII.	<b>LOGAN PUMPING - GENERATING PLANT (Located at Logan Dam)</b>				
	(Q=5,000cfs, TDH=332, eff=75%, HP=251,116)				
	Pumping-Generating Plant Complete	LS	\$ 184,246,400	JOB	\$ 184,246,400
	Subtotal				\$ 184,246,400
XIV.	<b>LOGAN PUMPING/GENERATING PLANT SWITCHYARD</b>				
	Station Equipment, Electrical				
	Transformer, 3 Phase, 65 MVA, 230/6.9 kv	EA	\$ 1,028,350	1	\$ 1,028,350
	230-kv Line Bay, 10,000 MVA	EA	\$ 650,325	3	\$ 1,950,976
	230-kv Bus-Tie Bay, 10,000 MVA	EA	\$ 573,089	1	\$ 573,089
	Coupling Capacitor, (w/potential device)	EA	\$ 12,049	5	\$ 60,244
	Carrier equipment	EA	\$ 30,894	2	\$ 61,789
	Telemetrting and supervisory control	LS	\$ 183,722	JOB	\$ 183,722
	Subtotal				\$ 3,858,169
	Increase capacity from 2,100cfs to 5,000cfs				
	Cost Factor = (5,000/2100)6/10 = 1.683			1.683	
	Adjusted Subtotal				\$ 6,493,299
XV.	<b>LOGAN CANAL</b>				
	Earthwork	LF	\$ 346	8,976	\$ 3,105,696
	Concrete Lining	LF	\$ 139	8,976	\$ 1,247,664
	Subtotal				\$ 4,353,360

## Description:

**COLUSA RESERVOIR - 3.3 MAF ALTERNATIVE****FACILITY GROUPING: STORAGE  
CODE: BRC033**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
XVI.	<b>LOGAN FOREBAY DAM</b>				
	Total Embankment Volume	CY		156,850	
	Excavation, all classes for foundation	CY	\$ 3.23	8,892	\$ 28,721
	Stripping borrow pits	CY	\$ 1.15	6,061	\$ 6,970
	Excavation, impervious and hauling to dam (borrow)	CY	\$ 3.22	60,515	\$ 194,860
	Excavation, rockfines and hauling to dam (borrow)	CY	\$ 7.15	23,323	\$ 166,861
	Excavation, rock and hauling to dam (borrow)	CY	\$ 7.15	53,181	\$ 380,485
	Placing impervious	CY	\$ 0.95	51,718	\$ 49,132
	Placing rockfines	CY	\$ 0.75	29,154	\$ 21,865
	Placing rock	CY	\$ 0.75	75,978	\$ 56,983
	F&P sand filter and gravel drain	CY	\$ 8.54	2,761	\$ 23,577
	Grouting foundation	LS	\$ 11,364	JOB	\$ 11,364
	Drains	LF	\$ 11.09	53	\$ 588
	Gravel on crest	CY	\$ 11.09	39	\$ 435
	10% minor items	LS		JOB	\$ 94,184
	<b>Subtotal</b>				<b>\$ 1,036,027</b>
XVII.	<b>SITES-COTTONWOOD ELVERTA #2 LOOP</b>				
	Clearing Land	LS	\$ 7,681	JOB	\$ 7,681
	Towers and Fixtures	LS	\$ 811,821	JOB	\$ 811,821
	Conductors and Devices	LS	\$ 430,831	JOB	\$ 430,831
	<b>Subtotal</b>				<b>\$ 1,250,333</b>

**CONSTRUCTION ESTIMATE****\$ 2,916,630,530**

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**NOTES:** The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
 Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

<sup>a</sup>LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 132,621,023  
Revision Date: October-96

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: RED BANK PROJECT

FACILITY GROUPING: STORAGE  
CODE: BRRB03

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	<b>SCHOENFIELD RESERVOIR</b>				
	Land Acquisition	AC	\$ 1,500	3,510	\$ 5,265,000
	Clearing	AC	\$ 1,097	2,925	\$ 3,208,725
	Access Road	MI	\$ 253,535	2	\$ 507,070
	Construction Facilities	LS	\$ 834,615	JOB	\$ 834,615
	Subtotal				\$ 9,815,410
II.	<b>SCHOENFIELD DAM AND SPILLWAY</b>				
	Mobilization	LS	\$ 665,574	JOB	\$ 665,574
	Excavation				
	Foundation Stripping, Rock	CY	\$ 5.54	97,250	\$ 539,115
	Spillway Channel	CY	\$ 5.55	76,480	\$ 424,192
	Embankment Structural Backfill	CY	\$ 13.31	2,000	\$ 26,623
	Construction Galleries and Adits	LS	\$ 554,645	JOB	\$ 554,645
	Roller Compacted Concrete: Material and Placement	CY	\$ 41.04	467,670	\$ 19,195,148
	Slipform Face Element Panels	CY	\$ 194	18,000	\$ 3,494,262
	Leveling Concrete	CY	\$ 144	14,250	\$ 2,055,514
	Spillway Crest	CY	\$ 410	520	\$ 213,427
	Spillway Training Walls	CY	\$ 283	720	\$ 203,666
	Spillway Basin Walls	CY	\$ 322	3,980	\$ 1,280,342
	Spillway Basin Floor	CY	\$ 144	4,350	\$ 627,858
	Cement	TON	\$ 105	9,000	\$ 948,443
	Reinforcing Steel	LB	\$ 0.78	3,699,000	\$ 2,871,951
	Foundation Treatment				
	Drill and Grout	LF	\$ 21.08	13,480	\$ 284,111
	Drainage	LF	\$ 6.66	6,740	\$ 44,860
	Miscellaneous	LS	\$ 1,663,934	JOB	\$ 1,663,934
	Subtotal				\$ 35,093,664
III.	<b>SCHOENFIELD DAM OUTLET WORKS</b>				
	Concrete				
	Intake	CY	\$ 322	1,430	\$ 460,022
	Substructure	CY	\$ 416	570	\$ 237,111
	Steel Liner Blocking	CY	\$ 322	1,270	\$ 408,551
	Cement	TON	\$ 105	850	\$ 89,575
	Reinforcing Steel	LB	\$ 0.78	490,000	\$ 380,486
	12' ID Steel Liner	LB	\$ 2.55	288,000	\$ 734,793
	13-54" Butterfly Valves	EA	\$ 110,929	13	\$ 1,442,077
	11' x 11' Bonnetted Slide Gate	EA	\$ 809,781	1	\$ 809,781
	12' Diameter Howell Bunker Valve	EA	\$ 809,781	1	\$ 809,781
	54" Bulkhead Gate	EA	\$ 110,929	1	\$ 110,929
	13 Trashracks (9,000 lbs each)	LB	\$ 3.63	117,000	\$ 424,710
	Subtotal				\$ 5,907,818
IV.	<b>BLUEDOOR RESERVOIR</b>				
	Land Acquisition	AC	\$ 1,500	115	\$ 172,500
	Clearing	AC	\$ 1,097	95	\$ 104,215
	Subtotal				\$ 276,715

Description:

**RED BANK PROJECT**

FACILITY GROUPING: STORAGE  
CODE: BRRB03

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
V.	<b>BLUEDOOR DAM</b>				
	Mobilization	LS	\$ 82,087	JOB	\$ 82,087
	Excavation Foundation Stripping, Rock	CY	\$ 5.55	18,790	\$ 104,218
	Construction Galleries and Adits	LS	\$ 221,858	JOB	\$ 221,858
	Roller Compacted Concrete: Material and Placement	CY	\$ 41.04	55,430	\$ 2,275,081
	Slipform Face Element Panels	CY	\$ 194	2,350	\$ 456,195
	Leveling Concrete	CY	\$ 144	3,530	\$ 509,190
	Cement	TON	\$ 105	1,140	\$ 120,136
	Reinforcing Steel	LB	\$ 0.78	352,000	\$ 273,297
	Foundation Treatment				
	Drill and Grout	LF	\$ 21.08	6,970	\$ 146,903
	Drainage	LF	\$ 6.66	3,490	\$ 23,229
	Miscellaneous	LS	\$ 206,328	JOB	\$ 206,328
		<b>Subtotal</b>			<b>\$ 4,418,523</b>
VI.	<b>BLUEDOOR DAM OUTLET WORKS</b>				
	Concrete				
	Intake	CY	\$ 322	17	\$ 5,469
	Substructure	CY	\$ 416	15	\$ 6,240
	Steel Liner Blocking	CY	\$ 322	155	\$ 49,863
	Cement	TON	\$ 105	49	\$ 5,164
	Reinforcing Steel	LB	\$ 0.78	28,050	\$ 21,781
	2.5' ID Steel Liner	LB	\$ 2.55	2,460	\$ 6,276
	2.5' x 2.5' Bonnetted Slide Gate	EA	\$ 133,115	1	\$ 133,115
	2.5' Diameter Howell Bunker Valve	EA	\$ 133,115	1	\$ 133,115
	2.5' X 2.5' Bulkhead Gate	EA	\$ 27,732	1	\$ 27,732
	1 Trashrack (2500 lbs)	LB	\$ 3.63	2,500	\$ 9,075
		<b>Subtotal</b>			<b>\$ 397,829</b>
VII.	<b>LANYAN RESERVOIR</b>				
	Land Acquisition	AC	\$ 1,500	70	\$ 105,000
	Clearing	AC	\$ 1,097	60	\$ 65,820
		<b>Subtotal</b>			<b>\$ 170,820</b>
VIII.	<b>LANYAN DAM</b>				
	Mobilization	LS	\$ 33,279	JOB	\$ 33,279
	Excavation Foundation Stripping, Rock	CY	\$ 5.54	8,700	\$ 48,229
	Construction Galleries and Adits	LS	\$ 221,858	JOB	\$ 221,858
	Roller Compacted Concrete: Material and Placement	CY	\$ 41.04	19,000	\$ 779,840
	Slipform Face Element Panels	CY	\$ 194	940	\$ 182,478
	Leveling Concrete	CY	\$ 144	1,560	\$ 225,025
	Cement	TON	\$ 105	480	\$ 50,584
	Reinforcing Steel	LB	\$ 0.78	141,100	\$ 109,552
	Foundation Treatment				
	Drill and Grout	LF	\$ 21.08	1,690	\$ 35,619
	Drainage	LF	\$ 6.66	840	\$ 5,591
	Miscellaneous	LS	\$ 83,197	JOB	\$ 83,197
		<b>Subtotal</b>			<b>\$ 1,775,251</b>
IX.	<b>LANYAN DAM OUTLET WORKS</b>				
	Concrete				
	Intake	CY	\$ 322	15	\$ 4,825
	Substructure	CY	\$ 416	13	\$ 5,408
	Steel Liner Blocking	CY	\$ 322	92	\$ 29,596
	Cement	TON	\$ 105	31	\$ 3,267
	Reinforcing Steel	LB	\$ 0.78	18,000	\$ 13,977
	2' ID Steel Liner	LB	\$ 2.55	1,290	\$ 3,291

## APPENDIX A 2.2

Description:

**RED BANK PROJECT**
**FACILITY GROUPING: STORAGE**  
**CODE: BRRB03**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	2' x 2' Bonnetted Slide Gate	EA	\$ 110,929	1	\$ 110,929
	2' Diameter Howell Bunker Valve	EA	\$ 110,929	1	\$ 110,929
	2' x 2' Bulkhead Gate	EA	\$ 11,093	1	\$ 11,093
	1 Trashracks (1,000 lbs)	LB	\$ 3.63	1,000	\$ 3,630
	<b>Subtotal</b>				<b>\$ 296,945</b>
<b>X.</b>	<b>DIPPINGVAT RESERVOIR</b>				
	Land Acquisition	AC	\$ 1,500	1,704	\$ 2,556,000
	Clearing	AC	\$ 1,097	1,420	\$ 1,557,740
	Access Road	MI	\$ 253,535	4	\$ 1,014,140
	Construction Facilities	LS	\$ 834,615	JOB	\$ 834,615
	Road Relocation	MI	\$ 319,674	3	\$ 959,023
	<b>Subtotal</b>				<b>\$ 6,921,518</b>
<b>XI.</b>	<b>DIPPINGVAT DAM AND SPILLWAY</b>				
	Mobilization	LS	\$ 554,645	JOB	\$ 554,645
	Excavation				
	Foundation Stripping, Rock	CY	\$ 5.54	119,650	\$ 663,291
	Spillway Channel, Rock	CY	\$ 5.55	73,730	\$ 408,940
	Embankment Structural Backfill	CY	\$ 13.31	2,000	\$ 26,623
	Construction Galleries and Adits	LS	\$ 554,645	JOB	\$ 554,645
	Roller Compacted Concrete: Material and Placement	CY	\$ 41.04	367,200	\$ 15,071,435
	Slipform Face Element Panels	CY	\$ 194	15,010	\$ 2,913,827
	Leveling Concrete	CY	\$ 144	12,100	\$ 1,745,384
	Spillway Crest	CY	\$ 410	580	\$ 238,054
	Spillway Training Walls	CY	\$ 283	634	\$ 179,339
	Spillway Basin Walls	CY	\$ 322	3,960	\$ 1,273,908
	Spillway Basin Floor	CY	\$ 144	5,240	\$ 756,316
	Cement	TON	\$ 105	8,060	\$ 849,383
	Reinforcing Steel	LB	\$ 0.78	3,290,400	\$ 2,554,709
	Foundation Treatment				
	Drill and Grout	LF	\$ 21.08	13,570	\$ 286,008
	Drainage	LF	\$ 6.66	6,790	\$ 45,192
	Miscellaneous	LS	\$ 1,331,148	JOB	\$ 1,331,148
	<b>Subtotal</b>				<b>\$ 29,452,845</b>
<b>XII.</b>	<b>DIPPINGVAT DAM OUTLET WORKS</b>				
	Concrete				
	F.C. Intake	CY	\$ 322	650	\$ 209,101
	F. C. Substructure	CY	\$ 416	970	\$ 403,504
	F. C. Steel Liner Blocking	CY	\$ 322	1,430	\$ 460,022
	Cons. Intake	CY	\$ 322	190	\$ 61,122
	Conc. Substructure	CY	\$ 416	13	\$ 5,408
	Conc. Steel Liner Blocking	CY	\$ 322	260	\$ 83,640
	Cement	TON	\$ 105	910	\$ 95,898
	Reinforcing Steel	LB	\$ 0.78	526,700	\$ 408,984
	15' ID F. C. Steel Liner	LB	\$ 2.55	315,000	\$ 803,680
	2' ID Cons. Steel Liner	LB	\$ 2.55	6,300	\$ 16,074
	20" Butterfly Valves	EA	\$ 22,186	7	\$ 155,301
	14' x 14' Bonnetted Slide Gate	EA	\$ 1,275,683	1	\$ 1,275,683
	2' Diameter Bonnetted Slide Gate	EA	\$ 110,929	1	\$ 110,929
	11' Diameter Howell Bunker Valve	EA	\$ 743,224	2	\$ 1,486,448
	2' Diameter Howell Bunker Valve	EA	\$ 110,929	1	\$ 110,929
	15' Diameter Bulkhead Gate	EA	\$ 693,306	1	\$ 693,306
	20" Diameter Bulkhead Gate	EA	\$ 22,186	1	\$ 22,186
	1 Trashrack (40,000 lbs)	LB	\$ 3.63	40,000	\$ 145,200
	7 Trashracks (1,000 lbs)	LB	\$ 3.63	7,000	\$ 25,410

## APPENDIX A 2.3

Description:

**RED BANK PROJECT**
**FACILITY GROUPING: STORAGE**  
**CODE: BRRB03**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>Subtotal</b>					<b>\$ 6,572,825</b>
<b>XIII.</b>	<b>SADDLE DAMS</b>				
	Dippingvat-Lanyan				
	Stripping	CY \$	5.56	5,010	\$ 27,853
	Excavation	CY \$	5.56	8,860	\$ 49,257
	Embankment	CY \$	3.34	8,860	\$ 29,554
	Lewis Flat				
	Stripping	CY \$	5.56	1,540	\$ 8,562
	Excavation	CY \$	5.56	3,090	\$ 17,179
	Embankment	CY \$	3.34	3,090	\$ 10,307
	Red Bank Road				
	Stripping	CY \$	5.56	340	\$ 1,890
	Excavation	CY \$	5.56	440	\$ 2,446
	Embankment	CY \$	3.34	440	\$ 1,468
	Last Chance Creek				
	Stripping	CY \$	5.56	33,300	\$ 185,129
	Excavation	CY \$	5.56	209,700	\$ 1,165,815
	Embankment	CY \$	3.34	209,700	\$ 699,489
	<b>Subtotal</b>				
					<b>\$ 2,198,948</b>
<b>XIV.</b>	<b>CONVEYANCE SYSTEM</b>				
	<b>DIPPINGVAT-LANYAN</b>				
	Channel Excavation	CY \$	6.03	258,100	\$ 1,556,421
	Concrete Lining	CY \$	350	2,490	\$ 870,896
	Cement	TON \$	115	650	\$ 74,474
	Reinforcing Steel	LB \$	0.84	249,400	\$ 210,554
	Tunnel				
	Mobilization	LS \$	81,219	JOB	\$ 81,219
	Excavation	CY \$	128	9,360	\$ 1,198,080
	Steel Supports	LB \$	1.05	174,600	\$ 183,330
	Timber Lagging	MBM \$	1,930	110	\$ 212,300
	Concrete Lining	CY \$	321	3,780	\$ 1,213,380
	Long Rebar	LB \$	0.82	95,400	\$ 78,606
	Grouting	LS \$	588,542	JOB	\$ 588,542
	Cement	TON \$	112	980	\$ 109,586
	Miscellaneous 5%	LS \$	201,281	JOB	\$ 201,281
	8' ID Steel Liner	LB \$	2.55	378,000	\$ 964,416
	8' Diameter Bulkhead Gate	EA \$	332,787	1	\$ 332,787
	7' x 7' Bonnetted Slide Gate	EA \$	476,995	1	\$ 476,995
	8' Diameter Howell Bunker Valve	EA \$	476,995	1	\$ 476,995
	1 Trashrack (20,000 lbs)	LB \$	3.63	20,000	\$ 72,600
	<b>Subtotal</b>				
					<b>\$ 8,902,462</b>
<b>XIV.</b>	<b>LANYAN - BLUEDOOR</b>				
	Channel Excavation	CY \$	6.03	63,310	\$ 381,778
	Concrete Lining	CY \$	350	1,500	\$ 524,636
	Cement	TON \$	115	390	\$ 44,685
	Reinforcing Steel	LB \$	8.44	150,000	\$ 1,266,364
	<b>Subtotal</b>				
					<b>\$ 2,217,463</b>
	<b>BLUEDOOR - SCHOENFIELD</b>				
	Channel Excavation	CY \$	6.03	119,100	\$ 718,209
	Concrete Lining	CY \$	350	10,920	\$ 3,819,353
	Cement	TON \$	115	2,840	\$ 325,395
	Reinforcing Steel	LB \$	8.44	1,580,000	\$ 13,339,030
	<b>Subtotal</b>				
					<b>\$ 18,201,987</b>

APPENDIX A 2.4

Description:

**RED BANK PROJECT**FACILITY GROUPING: STORAGE  
CODE: BRRB03

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>CONSTRUCTION ESTIMATE</b>					

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

NOTES: The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

\*CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre

APPENDIX A 2.5

D - 0 1 0 4 6 6

D-010466

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 309,544,698  
Revision Date: October-96

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: SITES RESERVOIR - 1.2 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	<b>RIGHTS-OF-WAY</b> Reservoir (Includes Buffer Area Factor of 1.32) Sites - Cottonwood Elverta #2 Loop	AC	\$ 1,500	16,240	\$ 24,360,000
		LS	\$ 13,276	JOB	\$ 13,276
		Subtotal			\$ 24,373,276
II.	<b>RELOCATION OF EXISTING PROPERTY</b> Secondary Road Relocation 12 kV Electrical Line	LS	\$ 13,254,000	JOB	\$ 13,254,000
		LS	\$ 438,000	JOB	\$ 438,000
		Subtotal			\$ 13,692,000
III.	<b>CLEARING RESERVOIR</b> Reservoir clearing	AC	\$ 1,097	700	\$ 768,033
		Subtotal			\$ 768,033
IV.	<b>ACCESS ROADS</b> Access Roads	LS	\$ 2,539,000	JOB	\$ 2,539,000
		Subtotal			\$ 2,539,000
V.	<b>GOLDEN GATE DAM, SITES DAM, AND 5 DIKES</b> Diversion and care of river and unwatering foundation Excavation all classes, equalizing channel Excavation all classes, for foundations Excavation, rock for grout cap Excavation, stripping, borrow pits Excavation, common, in borrow area and transportation to dam embankment Excavation, rock and rockfines in borrow area and transportation to embankments Placing earthfill in embankment Placing rock and rockfines in embankment Furnish and place sand and gravel filter Furnish and place riprap Furnish and place bedding for riprap Furnish 8-inch diameter sewer pipe and constructing toe drains Gravel surfacing on dam crest Seeding Water for seeding Drilling grout holes 0 to 30 feet Drilling grout holes 30 to 60 feet Drilling grout holes 60 to 110 feet Drilling grout holes 110 to 160 feet Concrete in grout caps Furnish and install grout pipe and fittings Hockups to grout holes Pressure grouting Cement	LS	\$ 240,698	JOB	\$ 240,698
		CY	\$ 3.58	183,000	\$ 655,140
		CY	\$ 3.23	419,500	\$ 1,354,985
		CY	\$ 7.15	2,000	\$ 14,300
		CY	\$ 1.15	340,000	\$ 391,000
		CY	\$ 3.22	5,320,000	\$ 17,130,400
		CY	\$ 7.15	1,484,000	\$ 10,610,600
		CY	\$ 0.95	4,859,900	\$ 4,616,905
		CY	\$ 0.75	2,024,000	\$ 1,518,000
		CY	\$ 8.54	27,100	\$ 231,434
		CY	\$ 31.64	54,000	\$ 1,708,560
		CY	\$ 11.79	28,000	\$ 330,120
		LF	\$ 20.00	2,350	\$ 47,000
		TON	\$ 11.99	1,850	\$ 22,182
		SY	\$ 0.13	43,340	\$ 5,448
		MGAL	\$ 10.48	1,000	\$ 10,476
		LF	\$ 18.70	18,180	\$ 339,966
		LF	\$ 18.70	9,090	\$ 169,983
		LF	\$ 18.70	5,760	\$ 107,712
		LF	\$ 18.70	1,720	\$ 32,164
		CY	\$ 146.67	2,000	\$ 293,333
		LB	\$ 3.98	17,400	\$ 69,269
		EA	\$ 41.90	610	\$ 25,562
		SKS	\$ 10.48	52,130	\$ 546,124
		BBL	\$ 20.95	16,090	\$ 337,124
		Subtotal			\$ 40,808,484

### APPENDIX A 3.1

Description:

SITES RESERVOIR - 1.2 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>VI. SPILLWAY</b>					
	Excavation, open cut, all classes	CY	\$ 4.03	8,557	\$ 34,485
	Backfill	CY	\$ 8.17	1,200	\$ 9,804
	Special compacted backfill	CY	\$ 13.51	300	\$ 4,053
	Structural Concrete in floors and crest	CY	\$ 365.24	485	\$ 177,141
	Structural Concrete in walls	CY	\$ 365.24	479	\$ 174,950
	Drilling and grouting anchors	LF	\$ 16.86	2,260	\$ 38,104
	F&I 4" dia. S.P. drains	LF	\$ 16.86	180	\$ 3,035
	Riprap	CY	\$ 31.64	200	\$ 6,328
	Bedding for riprap	CY	\$ 11.79	100	\$ 1,179
	F&I 6" dia. S.P. drains	LF	\$ 16.86	700	\$ 11,802
	10% Minor items	LS		JOB	\$ 46,088
	<b>Subtotal</b>				\$ 506,969
	Factor cost by ratio of max. water depths (244.3/295.8)=.826				
	<b>Adjusted Subtotal</b>				\$ 418,756
<b>VII. OUTLET WORKS</b>					
	Excavation all classes tailrace	CY	\$ 7.40	36,000	\$ 266,400
	Excavation, open cut	CY	\$ 3.38	6,000	\$ 20,280
	Excavation, tunnel	CY	\$ 128.27	9,700	\$ 1,244,219
	Excavation, gate chamber and shaft	CY	\$ 146.59	6,300	\$ 923,517
	Drilling grout holes	LF	\$ 18.70	13,400	\$ 250,580
	F&I grout pipe and fittings	LB	\$ 4.59	6,700	\$ 30,753
	Hookups to grout holes	EA	\$ 91.73	446	\$ 40,912
	Pressure grouting	SKS	\$ 91.73	13,400	\$ 1,229,182
	Concrete in tunnel lining	CY	\$ 320.68	7,240	\$ 2,321,723
	Structural Concrete in intake	CY	\$ 339.50	3,950	\$ 1,341,025
	Structural Concrete in gate chamber and shaft	CY	\$ 339.50	3,110	\$ 1,055,845
	Structural Concrete in stilling basin	CY	\$ 339.50	3,850	\$ 1,307,075
	Structural Concrete in anchor blocks	CY	\$ 256.15	3,000	\$ 768,450
	Metal control house	LS	\$ 9,173.00	JOB	\$ 9,173
	Specially compacted backfill	CY	\$ 15.61	800	\$ 12,488
	F&I 11x11 fixed wheel gates	LB	\$ 5.55	116,000	\$ 643,800
	2-42" H.J. valves and controls	LB	\$ 6.28	32,222	\$ 202,354
	2 guard gates for 42" H.J. valves	LB	\$ 6.92	32,000	\$ 221,440
	4-6.5"x8.0' H.P. gates	LB	\$ 4.59	564,000	\$ 2,588,760
	144" dia. penstock & manifold for H.P. gates	LB	\$ 1.65	2,000,000	\$ 3,300,000
	F&I tunnel supports	LB	\$ 3.66	288,000	\$ 1,054,080
	Trashrack metalwork	LB	\$ 3.63	74,000	\$ 268,620
	F&I tower bulkhead	LB	\$ 3.02	100,000	\$ 302,000
	Tunnel vent system	LS	\$ 129,555	JOB	\$ 129,555
	Other misc. metalwork	LB	\$ 3.63	3,000	\$ 10,890
	Rockbolts	LF	\$ 64.14	27,900	\$ 1,789,506
	Chain link fabric	SF	\$ 12.88	23,000	\$ 296,240
	10% Minor items	LS		JOB	\$ 2,162,887
	<b>Subtotal</b>				\$ 23,791,754
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works Capacity from 2,100cfs to 15,200cfs				
	Cost Factor = $(15,200/2,100)^{3/8} = 2.10$				
	<b>Adjusted Subtotal</b>				\$ 49,962,683
<b>VIII. SITES PUMPING - GENERATING PLANT (Located at Golden Gate Dam)</b>					
	(Q=5,000cfs, TDH=290, eff=75%, 219,350 HP)				
	Structure, Equipment and Electrical, Complete	LS	\$ 169,864,000	JOB	\$ 169,864,000

## APPENDIX A 3.2

Description:

**SITES RESERVOIR - 1.2 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE  
CODE: BRSI12

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
		Subtotal			
					<b>\$ 169,864,000</b>
<b>IX.</b>	<b>SITES PUMPING/GENERATING PLANT SWITCHYARD</b>				
	Station Equipment, Electrical				
	Transformer, 3 Phase, 65 MVA, 230/6.9 kv	EA	\$ 1,028,350	1	\$ 1,028,350
	230-kv Line Bay, 10,000 MVA	EA	\$ 650,325	3	\$ 1,950,975
	230-kv Bus-Tie Bay, 10,000 MVA	EA	\$ 573,089	1	\$ 573,089
	Coupling Capacitor, (w/potential device)	EA	\$ 12,049	5	\$ 60,245
	Carrier equipment	EA	\$ 30,894	2	\$ 61,788
	Telemetry and supervisory control	LS	\$ 183,722	JOB	\$ 183,722
		Subtotal			
					<b>\$ 3,858,169</b>
	Increase capacity from 2,100cfs to 5,000cfs				
	Cost Factor = (5,000/2100)6/10 = 1.683				
		Adjusted Subtotal			
					<b>\$ 6,493,298</b>
<b>X.</b>	<b>SITES-COTTONWOOD ELVERTA #2 LOOP</b>				
	Clearing Land	LS	\$ 3,841	JOB	\$ 3,841
	Towers and Fixtures	LS	\$ 405,911	JOB	\$ 405,911
	Conductors and Devices	LS	\$ 215,416	JOB	\$ 215,416
		Subtotal			
					<b>\$ 625,168</b>
	<b>CONSTRUCTION ESTIMATE</b>				
					<b>\$ 309,544,698</b>

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

\*NOTES: The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

\*AC=acre; LS=lump sum; MI=mile; CY=cubic yard; LF=linear Foot; SY=square yard; MGAL=million gallons;  
LB=pound; EA=each; BBL=barrel

### APPENDIX A 3.3

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 445,345,133  
Revision Date: October-96

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: SITES RESERVOIR - 1.9 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRSI19

ITEM No.	ITEM	UNIT*	UNIT COST*	QUANTITY	ITEM COST
I.	<b>RIGHTS-OF-WAY</b> Sites-Cottonwood Elverta #2 Loop Reservoir (Includes Buffer Area Factor of 1.32)	LS    AC	\$    \$	13,276    1,500	JOB    19,400
		Subtotal			\$
					29,100,000
					<u>29,113,276</u>
II.	<b>RELOCATION OF EXISTING PROPERTY</b> Secondary Road Relocation 12 kV Electrical Line	MI    LS	\$    \$	1,131,113    523,253	14    JOB
		Subtotal			\$
					15,835,579
					<u>523,253</u>
					<u>16,358,832</u>
III.	<b>CLEARING RESERVOIR</b> Reservoir clearing	AC	\$	1,097	700
		Subtotal			\$
					768,033
					<u>768,033</u>
IV.	<b>ACCESS ROADS</b> Access roads	MI	\$	532,281	5.7
		Subtotal			\$
					3,034,003
					<u>3,034,003</u>
V.	<b>GOLDEN GATE DAM - Earth and Rockfill Structure; Crest Elevation 541.3</b>				
	Excavation, all classes for foundation	CY	\$	3.23	468,000
	Stripping borrow pits	CY	\$	1.15	319,000
	Excavation, impervious and hauling to dam (borrow)	CY	\$	3.22	3,185,000
	Excavation, rockfines and hauling to dam (borrow)	CY	\$	7.15	1,227,500
	Excavation, rock and hauling to dam (borrow)	CY	\$	7.15	2,799,000
	Placing impervious	CY	\$	0.95	2,722,000
	Placing rockfines	CY	\$	0.75	1,534,400
	Placing rock	CY	\$	0.75	3,998,800
	F&P sand filter and gravel drain	CY	\$	8.54	145,300
	Grouting foundation	LS	\$	598,114	JOB
	Drains	LF	\$	11.09	2,790
	Gravel on crest	CY	\$	11.09	2,066
	10% minor items	LS	\$	4,957,030	JOB
		Subtotal			\$
					<u>54,527,325</u>
VI.	<b>SITES DAM - Earthfill and Rockfill Structure; Crest Elevation 541.5</b>				
	Diversion and care of river	LS	\$	238,464	JOB
	Excavation for equalizing channel and fill in coffer dams	CY	\$	3.58	183,000
	Excavation, all classes for foundation	CY	\$	3.23	209,300
	Stripping borrow pits	CY	\$	1.15	167,000
	Excavation, impervious and hauling to dam (borrow)	CY	\$	3.22	1,666,000
	Excavation, rockfines and hauling to dam (borrow)	CY	\$	7.15	470,100
	Excavation, rock and hauling to dam (borrow)	CY	\$	7.15	1,133,600
	Placing impervious	CY	\$	0.95	1,424,000
	Placing rockfines	CY	\$	0.75	587,600
	Placing rock	CY	\$	0.75	1,619,400
	F&P sand filters and gravel drains	CY	\$	8.54	128,600
	Grouting foundation	LS	\$	237,528	JOB
	Drains	LF	\$	18.24	2,350

### APPENDIX A 4.1

## Description:

SITES RESERVOIR - 1.9 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRSI19

ITEM No.	ITEM	UNIT*	UNIT COST*	QUANTITY	ITEM COST
	Gravel on crest	CY \$	12.88	730	\$ 9,401
	10% Minor items	LS		JOB	\$ 2,299,543
		Subtotal			\$ 25,294,973
VII.	<b>DIKES</b>				
	Excavation, all classes for foundation	CY \$	3.23	539,000	\$ 1,740,970
	Excavation, impervious and hauling to dam (borrow)	CY \$	3.22	4,115,500	\$ 13,251,910
	Excavation, sand, gravel and hauling to dam (borrow)	CY \$	9.52	970,000	\$ 9,229,984
	Excavation, rock and hauling to dam (borrow)	CY \$	9.52	1,671,000	\$ 15,900,312
	Placing impervious	CY \$	0.95	3,517,500	\$ 3,341,625
	Placing rockfines	CY \$	0.75	1,212,500	\$ 909,375
	Placing rock	CY \$	0.75	2,387,500	\$ 1,790,625
	F&P riprap	CY \$	31.64	169,700	\$ 5,369,308
	F&P filter blanket	CY \$	8.54	504,100	\$ 4,305,014
	F&P bedding for riprap	CY \$	11.79	84,900	\$ 1,000,971
	Grouting foundation	LS \$	812,748	JOB	\$ 812,748
	10% Minor items	LS		JOB	\$ 5,765,284
		Subtotal			\$ 63,418,126
VIII.	<b>SPILLWAY</b>				
	Excavation, open cut, all classes	CY \$	4.03	8,557	\$ 34,485
	Backfill	CY \$	8.17	1,200	\$ 9,804
	Special compacted backfill	CY \$	13.51	300	\$ 4,054
	Structural Concrete in floors and crest	CY \$	365.24	485	\$ 177,141
	Structural Concrete in walls	CY \$	365.24	479	\$ 174,950
	Drilling and grouting anchors	LF \$	16.86	2,260	\$ 38,095
	F&I 4" dia. S.P. drains	LF \$	16.86	180	\$ 3,034
	Riprap	CY \$	31.64	200	\$ 6,328
	Bedding for riprap	CY \$	11.79	100	\$ 1,179
	F&I 6" dia. S.P. drains	LF \$	16.86	700	\$ 11,799
	10% Minor items	LS		JOB	\$ 46,087
		Subtotal			\$ 506,957
IX.	<b>OUTLET WORKS</b>				
	Excavation all classes tailrace	CY \$	7.40	36,000	\$ 266,513
	Excavation, open cut	CY \$	3.38	6,000	\$ 20,280
	Excavation, tunnel	CY \$	128.27	9,700	\$ 1,244,219
	Excavation, gate chamber and shaft	CY \$	146.59	6,300	\$ 923,517
	Drilling grout holes	LF \$	18.70	13,400	\$ 250,580
	F&I grout pipe and fittings	LB \$	4.59	6,700	\$ 30,731
	Hookups to grout holes	EA \$	91.73	446	\$ 40,914
	Pressure grouting	Sack \$	91.73	13,400	\$ 1,229,241
	Concrete in tunnel lining	CY \$	321	7,240	\$ 2,321,723
	Structural Concrete in intake	CY \$	340	3,950	\$ 1,341,025
	Structural Concrete in gate chamber and shaft	CY \$	340	3,110	\$ 1,055,845
	Structural Concrete in stilling basin	CY \$	340	3,850	\$ 1,307,075
	Structural Concrete in anchor blocks	CY \$	256	3,000	\$ 768,450
	Metal control house	LS \$	9,173	JOB	\$ 9,173
	Specially compacted backfill	CY \$	15.61	800	\$ 12,489
	F&I 11x11 fixed wheel gates	LB \$	5.55	116,000	\$ 644,072
	2-42" H.J. valves and controls	LB \$	6.28	32,222	\$ 202,243
	2 guard gates for 42" H.J. valves	LB \$	6.92	32,000	\$ 221,450
	4-6.5'x8.0' H.P. gates	LB \$	4.59	564,000	\$ 2,586,909
	144" dia. penstock & manifold for H.P. gates	LB \$	1.65	2,000,000	\$ 3,300,000
	F&I tunnel supports	LB \$	3.66	288,000	\$ 1,054,080
	Trashrake metalwork	LB \$	3.63	74,000	\$ 268,620

## APPENDIX A 4.2

Description:

**SITES RESERVOIR - 1.9 MAF ALTERNATIVE**
**FACILITY GROUPING: STORAGE  
CODE: BRSI19**

ITEM No.	ITEM	UNIT*	UNIT COST*	QUANTITY	ITEM COST
	F&I tower bulkhead	LB	\$ 3.02	100,000	\$ 302,000
	Tunnel vent system	LS	\$ 129,555	JOB	\$ 129,555
	Other misc. metalwork	LB	\$ 3.63	3,000	\$ 10,890
	Rockbolts	LF	\$ 64.14	27,900	\$ 1,789,506
	Chain link fabric	SF	\$ 12.88	23,000	\$ 296,125
	10% Minor items	LS		JOB	\$ 2,162,722
	Subtotal				\$ 23,789,947
	Upsize Outlet Works for Emergency Evacuation				
	Increase Outlet Works capacity from 2,100cfs to 22,000cfs				
	Cost Factor = (22,000/2100) <sup>3/8</sup> = 2.413				
	Adjusted Subtotal				\$ 57,405,142
X.	<b>SITES PUMPING - GENERATING PLANT (Located at Golden Gate Dam)</b>				
	(Q=5,000cfs, TDH=342, eff=75%, 258,680 HP)				
	Structures, Equipment and Electrical, Complete	LS	\$ 187,800,000	JOB	\$ 187,800,000
	Subtotal				\$ 187,800,000
XI.	<b>SITES PUMPING-GENERATING PLANT SWITCHYARD</b>				
	Station Equipment, Electrical				
	Transformer, 3 Phase, 65 MVA, 230/6.9 kv	EA	\$ 1,028,350	1	\$ 1,028,350
	230-kv Line Bay, 10,000 MVA	EA	\$ 650,325	3	\$ 1,950,976
	230-kv Bus-Tie Bay, 10,000 MVA	EA	\$ 573,089	1	\$ 573,089
	Coupling Capacitor, (w/potential device)	EA	\$ 12,049	5	\$ 60,244
	Carrier equipment	EA	\$ 30,894	2	\$ 61,789
	Telemetry and supervisory control	LS	\$ 183,722	JOB	\$ 183,722
	Subtotal				\$ 3,858,169
	Increase capacity from 2,100cfs to 5,000cfs				
	Cost Factor = (5,000/2100)6/10 = 1.683				
	Adjusted Subtotal				\$ 6,493,299
XII.	<b>SITES-COTTONWOOD ELVERTA #2 LOOP</b>				
	Clearing Land	LS	\$ 3,841	JOB	\$ 3,841
	Towers and Fixtures	LS	\$ 405,911	JOB	\$ 405,911
	Conductors and Devices	LS	\$ 215,416	JOB	\$ 215,416
	Subtotal				\$ 625,167
	<b>CONSTRUCTION ESTIMATE</b>				\$ 445,345,133

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**\*NOTES:** The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 934,737,267  
Revision Date: October-96

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

Description: THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: BRTN18

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. LANDS</b>					
	Newville Reservoir Right of Way	AC	\$ 1,500	18,350	\$ 27,525,000
	Thomes Creek Diversion Right of Way	AC	\$ 1,500	125	\$ 187,500
	Tehenn Reservoir right of Way	AC	\$ 1,500	1,250	\$ 1,875,000
	Tehenn Canal Right of Way	AC	\$ 1,500	212	\$ 318,000
	Black Butte Canal Right of Way	AC	\$ 1,500	191	\$ 286,500
	Sour Grass Canal Right of Way	AC	\$ 1,500	191	\$ 286,500
	<b>Subtotal</b>				<b>\$ 30,478,500</b>
<b>II. DAM</b>					
	Mobilization	LS	\$ 2,770,455	JOB	\$ 2,770,455
	Care of Water	LS	\$ 180,682	JOB	\$ 180,682
	Foundation Excavation and Stripping	CY	\$ 3.23	1,946,670	\$ 6,287,744
	Imported Borrow - Impervious	CY	\$ 3.22	4,301,200	\$ 13,849,864
	Place and Compact Impervious Material	CY	\$ 0.95	3,910,200	\$ 3,714,690
	Furnish and Compact Filter and Drain	CY	\$ 8.54	1,595,300	\$ 13,623,862
	Furnish and Compact Random Material	CY	\$ 3.11	1,677,800	\$ 5,217,958
	Furnish and Compact Sand and Gravel	CY	\$ 5.90	8,816,930	\$ 52,019,887
	Drill Grout Holes	LF	\$ 18.70	35,300	\$ 660,110
	Grout Connections	EA	\$ 60.00	380	\$ 22,800
	Grouting	CY	\$ 229	870	\$ 199,230
	Grout Pipe	LF	\$ 10.00	1,140	\$ 11,400
	Instrumentation	LS	\$ 421,591	JOB	\$ 421,591
	<b>Subtotal</b>				<b>\$ 98,980,273</b>
<b>III. OUTLET WORKS</b>					
	Dewatering	LS	\$ 146,099	JOB	\$ 146,099
	Excavations for:				
	Gate Chamber	CY	\$ 146	1,500	\$ 219,000
	Intake and Gate Chamber	CY	\$ 6.76	12,000	\$ 81,120
	Penstocks and Tunnel	CY	\$ 128.27	37,000	\$ 4,745,990
	Portal	CY	\$ 9.00	127,000	\$ 1,143,000
	By-pass and Trifureation	CY	\$ 6.00	9,000	\$ 54,000
	Shaft	CY	\$ 147	1,000	\$ 146,590
	Diversion Channel	CY	\$ 6.00	71,000	\$ 426,000
	Compaction Backfill	CY	\$ 29.00	7,000	\$ 203,000
	Granular Structural Backfill	CY	\$ 18.99	2,000	\$ 37,980
	Concrete				
	Penstock-Tunnel	CY	\$ 321	10,500	\$ 3,367,140
	Intake and Gate Chamber Access Tunnel	CY	\$ 321	3,600	\$ 1,154,448
	Gate Chambers	CY	\$ 340	700	\$ 237,650
	Low Intake	CY	\$ 340	500	\$ 169,750
	Low Intake Foundation	CY	\$ 270	400	\$ 108,180
	Control Valve House	CY	\$ 340	700	\$ 237,650
	Vertical Shaft	CY	\$ 340	300	\$ 101,850
	Grouting Cement	BBL	\$ 26.00	21,000	\$ 546,000
	Mass Concrete	CY	\$ 293	4,000	\$ 1,172,360
	Ring Girder	LBS	\$ 3.00	72,000	\$ 216,000
	Overhead Hoist Rails	LBS	\$ 3.63	150,000	\$ 544,500

### APPENDIX A 5.1

Description:

**THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE**
**FACILITY GROUPING: STORAGE**  
**CODE: BRTN18**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	2 1/2 " x 2 1/2 " x 1/4 " Angles	LBS	\$ 3.63	27,000	\$ 98,010
	1 1/2 " x 30 " x 20 " Bearing Plate	LBS	\$ 3.63	30,000	\$ 108,900
	Walkway Plate	LBS	\$ 3.63	54,000	\$ 196,020
	Gantry Crane (20 ton)	EA	\$ 284,894	1	\$ 284,894
	Trashrack 6 ' x 18 '	EA	\$ 14,610	6	\$ 87,660
	60 " Dia. Gate Valve	EA	\$ 112,496	12	\$ 1,349,952
	84 " Dia. Howell Bunker Valve	EA	\$ 438,298	2	\$ 876,596
	84 " Dia. Gate Valve	EA	\$ 452,908	2	\$ 905,816
	90 " Dia Gate Valve	EA	\$ 511,348	1	\$ 511,348
	Valve Thimbles	EA	\$ 21,915	12	\$ 262,980
	Valve Operator	EA	\$ 29,220	12	\$ 350,640
	120 " Dia. Steel Penstock	LBS	\$ 1.65	1,050,000	\$ 1,732,500
	90 " Dia. Steel By-pass	LBS	\$ 1.65	200,000	\$ 330,000
	72 " Dia. Steel By-pass	LBS	\$ 1.65	50,000	\$ 82,500
	60 " Dia. Steel By-pass	LBS	\$ 1.65	97,000	\$ 160,050
	Grouting Pipe	LBS	\$ 10.00	13,630	\$ 136,300
	Bifurcation 10 ' to 8 '	EA	\$ 24,837	2	\$ 49,674
	Reducer 10 ' to 6'	EA	\$ 14,610	1	\$ 14,610
	Bifurcation 10 ' to 5 '	EA	\$ 20,454	2	\$ 40,908
	Timber for Tunnel Supports	MBF	\$ 1,930	300	\$ 579,000
	Grout Drilling Holes	LF	\$ 17.70	18,500	\$ 327,450
	Standby Generator	EA	\$ 65,745	1	\$ 65,745
	Architectural Features	LS	\$ 438,298	JOB	\$ 438,298
	Cathodic Protection	LS	\$ 51,135	JOB	\$ 51,135
	Protective Coatings	LS	\$ 146,099	JOB	\$ 146,099
	<b>Subtotal</b>				<b>\$ 24,245,392</b>
	Increase Capacity from 1,500 cfs to 5,000 cfs, factor cost by $(5,000/1,500)^{3/8} = 1.57$				
	<b>Adjusted Subtotal</b>				<b>\$ 38,065,265</b>
<b>IV.</b>	<b>SPILLWAY</b>				
	Mobilization	LS	\$ 390,210	JOB	\$ 390,210
	Drill Grout Holes	LF	\$ 18.70	920	\$ 17,204
	Grout Connections	EA	\$ 33.00	15	\$ 495
	Grouting	CY	\$ 364	23	\$ 8,372
	Grout Pipe	LF	\$ 10.00	68	\$ 680
	Excavation (blasting)	CY	\$ 7.66	725,000	\$ 5,553,500
	Excavation	CY	\$ 4.03	249,000	\$ 1,003,470
	Rock Riprap	CY	\$ 31.64	2,000	\$ 63,280
	Granular Backfill	CY	\$ 45.09	5,800	\$ 261,522
	Structural Backfill	CY	\$ 26.00	8,100	\$ 210,600
	Compacted Backfill	CY	\$ 8.17	44,700	\$ 365,199
	Aggregate Base	TON	\$ 19.15	480	\$ 9,192
	Asphalt Concrete	TON	\$ 58.92	400	\$ 23,568
	Mass Concrete	CY	\$ 293	6,200	\$ 1,817,158
	Structural Concrete	CY	\$ 401	20,700	\$ 8,307,117
	Embedded Metal	LS	\$ 45,524	JOB	\$ 45,524
	Misc. Metal	LS	\$ 65,035	JOB	\$ 65,035
	Radial Gate (20 ' x 30 ')	EA	\$ 351,189	2	\$ 702,378
	Radial Gate Hoist Assembly	EA	\$ 117,063	2	\$ 234,126
	Stop Log (6 ' x 21 ')	EA	\$ 18,210	12	\$ 218,520
	Stop Log Storage Rack	LS	\$ 26,014	JOB	\$ 26,014
	Stop Log Lifting Beam	LS	\$ 6,503	JOB	\$ 6,503
	Electrical Work	LS	\$ 39,021	JOB	\$ 39,021
	Control Building ( 12 ' x 16 ' )	LS	\$ 33,818	JOB	\$ 33,818
	Standby Generator	LS	\$ 52,028	JOB	\$ 52,028
	<b>Subtotal</b>				<b>\$ 19,454,534</b>

## APPENDIX A 5.2

Description:

**THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE**
**FACILITY GROUPING: STORAGE**  
**CODE: BRTN18**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
V.	<b>RESERVOIR</b>				
	Reservoir Clearing (Newville and Tehenn)	AC	\$ 1,097	1,515	\$ 1,661,955
	Improvements	LS	\$ 38,540	JOB	\$ 38,540
	Construction Facilities	LS	\$ 25,693	JOB	\$ 25,693
	Excavate Overlook	CY	\$ 18.00	48,400	\$ 871,200
	Aggregate Base for Overlook	TON	\$ 19.15	2,000	\$ 38,300
	Asphalt Concrete for Overlook	TON	\$ 58.92	511	\$ 30,108
	Liquid Asphalt Prime and Seal	TON	\$ 324	85	\$ 27,543
	Landscaping Overlook	LS	\$ 30,832	JOB	\$ 30,832
	Visitor's Center	LS	\$ 256,934	JOB	\$ 256,934
	<b>Subtotal</b>				<b>\$ 2,981,105</b>
VI.	<b>OVERLOOK ACCESS ROAD</b>				
	Excavation	CY	\$ 3.98	106,000	\$ 421,880
	Class II Aggregate Base	TON	\$ 19.15	5,710	\$ 109,347
	Asphalt Concrete	TON	\$ 58.92	941	\$ 55,444
	Liquid Asphalt Prime and Seal Coat	TON	\$ 324	157	\$ 50,873
	Guard Rail	LF	\$ 30.00	2,650	\$ 79,500
	18 " CMP	LF	\$ 44.78	180	\$ 8,060
	24 " CMP	LF	\$ 53.53	490	\$ 26,230
	30 " CMP	LF	\$ 67.00	200	\$ 13,400
	Structure Excavation	CY	\$ 18.00	350	\$ 6,300
	Structure Backfill	CY	\$ 30.00	270	\$ 8,100
	<b>Subtotal</b>				<b>\$ 779,133</b>
VII.	<b>ROAD RELOCATIONS</b>				
	Newville to Paskenta				
	48 " CSP	LF	\$ 90.00	140	\$ 12,600
	26 " CSP	LF	\$ 60.00	240	\$ 14,400
	24 " CSP	LF	\$ 45.00	160	\$ 7,200
	18 " CSP	LF	\$ 38.00	570	\$ 21,660
	Structure Excavation	CY	\$ 38.00	4,700	\$ 178,600
	Structure Backfill	CY	\$ 68.00	4,400	\$ 299,200
	Roadway Excavation	CY	\$ 3.98	1,033,000	\$ 4,111,340
	Aggregate Base	TON	\$ 19.15	31,000	\$ 593,650
	Asphalt Concrete	TON	\$ 58.92	15,000	\$ 883,800
	Down Drains	EA	\$ 1,500	24	\$ 36,000
	Fence	LF	\$ 3.00	66,800	\$ 200,400
	<b>Subtotal</b>				<b>\$ 6,358,850</b>
	Cattle Crossings (6 total)				
	11' - 5" x 73 " Multiple Steel Pipe	LF	\$ 270	432	\$ 116,640
	Structure Excavation	CY	\$ 38.00	1,710	\$ 64,980
	Structure Backfill	CY	\$ 68.00	1,100	\$ 74,800
	<b>Subtotal</b>				<b>\$ 256,420</b>
	Round Valley Road				
	48 " CSP	LF	\$ 90.00	300	\$ 27,000
	24 " CSP	LF	\$ 45.00	2,120	\$ 95,400
	Roadway Excavation	CY	\$ 3.98	233,000	\$ 927,340
	Structure Excavation	CY	\$ 38.00	2,000	\$ 76,000
	Structure Backfill	CY	\$ 68.00	1,600	\$ 108,800
	Aggregate Base	TON	\$ 19.15	9,100	\$ 174,265
	Asphalt Concrete	TON	\$ 58.92	4,400	\$ 259,248
	Down Drains	EA	\$ 1,500	12	\$ 18,000
	Fence	LF	\$ 3.00	20,000	\$ 60,000
	Compacted Embankment and Overhaul	CY	\$ 1.36	211,000	\$ 286,960

## APPENDIX A 5.3

Description:

**THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE**
**FACILITY GROUPING: STORAGE  
CODE: BRTN18**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Bridge D/S of Newville Spillway	SF	\$ 100	6,800	\$ 680,000
		Subtotal			\$ 2,713,013
	Chrome to Burrows Gap Road				
	60 " CSP	LF	\$ 105	250	\$ 26,250
	24 " CSP	LF	\$ 45.00	920	\$ 41,400
	Roadway Excavation	CY	\$ 3.98	202,000	\$ 803,960
	Structure Excavation	CY	\$ 38.00	1,600	\$ 60,800
	Structure Backfill	CY	\$ 68.00	1,800	\$ 122,400
	Aggregate Base	TON	\$ 19.15	9,100	\$ 174,265
	Asphalt Concrete	TON	\$ 58.92	5,300	\$ 312,276
	Fence	LF	\$ 3.00	53,000	\$ 159,000
	Bridge over Stony Creek Diversion	SF	\$ 100	6,800	\$ 680,000
		Subtotal			\$ 2,380,351
		Subtotal (Road Relocations)			\$ 11,708,634
VIII.	<b>BURROWS GAP SADDLE DAM</b>				
	Mobilization	LS	\$ 103,591	JOB	\$ 103,591
	Clear and Grub	AC	\$ 4,818	3	\$ 14,454
	Foundation Excavation	CY	\$ 3.23	87,400	\$ 282,302
	Drill Grout Holes	LF	\$ 18.70	2,700	\$ 50,490
	Grout Connections	EA	\$ 60.00	50	\$ 3,000
	Grouting	CY	\$ 337	67	\$ 22,579
	Grout Pipe	LF	\$ 10.00	225	\$ 2,250
	Borrow - Impervious Material	CY	\$ 3.22	176,500	\$ 568,330
	Filter and Drain Material	CY	\$ 8.54	26,600	\$ 227,164
	Riprap	CY	\$ 31.64	6,640	\$ 210,090
	Riprap Bedding	CY	\$ 1.79	3,320	\$ 5,943
	Placed Impervious	CY	\$ 0.95	160,500	\$ 152,475
	Instrumentation	LS	\$ 66,667	JOB	\$ 66,667
		Subtotal			\$ 1,709,334
IX.	<b>THOMES CREEK DIVERSION FACILITIES</b>				
	Diversion Structure	LS	\$ 13,583,306	JOB	\$ 13,583,306
	Intake Structure	LS	\$ 2,007,787	JOB	\$ 2,007,787
	Canal and Roads	LS	\$ 36,052,167	JOB	\$ 36,052,167
	Outlet Chute	LS	\$ 3,247,377	JOB	\$ 3,247,377
		Subtotal			\$ 54,890,637
X.	<b>CONVEYANCE FACILITIES</b>				
	Tehama Colusa Canal Turnout	LS	\$ 1,543,000	JOB	\$ 1,543,000
	Sour Grass Canal	LS	\$ 20,715,151	JOB	\$ 20,715,151
	Sour Grass Pumping-Generating Plant Q=5,000 cfs, TDH = 115 ft., HP = 86,983	LS	\$ 97,528,800	JOB	\$ 97,528,800
	Black Butte Canal , factored by $(5,000/10,000)^{3/8}$	LS	\$ 24,213,756	JOB	\$ 24,213,756
	Black Butte Pumping-Generating Plant Q=5,000 cfs, TDH = 144 ft., HP = 108,918	LS	\$ 111,617,600	JOB	\$ 111,617,600
	Tehenn Canal, factored by $5,000/3,000^{3/8}$	LS	\$ 74,676,709	JOB	\$ 74,676,709
	Tehenn Reservoir	LS	\$ 40,202,835	JOB	\$ 40,202,835
	Tehenn Pumping-Generating Plant Q=5,000 cfs, TDH = 190 ft., HP = 143,711	LS	\$ 131,816,000	JOB	\$ 131,816,000
	Newville Pumping-Generating Plant Q=5,000 cfs, TDH = 300 ft., HP = 226,912	LS	\$ 173,376,000	JOB	\$ 173,376,000
		Subtotal			\$ 675,689,851

## APPENDIX A 5.4

Description: **THOMES-NEWVILLE RESERVOIR PROJECT - 1.84 MAF ALTERNATIVE**

FACILITY GROUPING: STORAGE  
CODE: BRTN18

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>CONSTRUCTION ESTIMATE</b>					<b>934,737,267</b>

REFERENCES: 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

APPENDIX A 5.5

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 155,926,843  
Revision Date: October-96

## SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

Description: MONTGOMERY RESERVOIR

FACILITY GROUPING: STORAGE  
CODE: CRMO02

ITEM No.	ITEM	UNITa	UNIT COST	QUANTITY	ITEM COST
I.	<b>LAND AND RIGHTS</b>				
	Reservoir Rights-of-Way (8,050 Ac x 1.32 Buffer Factor)	AC	\$	2,500	10,626 \$ 26,565,000
		Subtotal			\$ 26,565,000
II.	<b>RELOCATION OF EXISTING PROPERTY</b>				
	County Road Relocation	LS	\$	2,528,878	JOB \$ 2,528,878
	Relocate Telephone Line	MI	\$	36,000	8 \$ 288,000
	Additional Roads	MI	\$	36,000	5 \$ 162,000
		Subtotal			\$ 2,978,878
III.	<b>CLEARING LANDS</b>				
	Reservoir Clearing	AC	\$	1,097	8,050 \$ 8,830,850
		Subtotal			\$ 8,830,850
IV.	<b>DAM AND DIKES</b>				
	Mongomery Dam				
	Diversion of Water and Unwatering Foundations	LS	\$	73,953	JOB \$ 73,953
	Excavation for Dam Foundation	CY	\$	3.23	1,100,000 \$ 3,553,000
	Excavation, Stripping Borrow Pits	CY	\$	1.15	150,000 \$ 172,500
	Excavation, Earthfill, in Borrow Pits and Haul to Dam	CY	\$	2.40	2,800,000 \$ 6,729,767
	Excavation, Misc Fill, in Borrow Pits and Haul to Dam	CY	\$	1.85	180,000 \$ 332,791
	Excav., Sand and Gravel, in Borrow Pits and Haul to Dam	CY	\$	2.59	1,000,000 \$ 2,588,372
	Earthfill	CY	\$	0.59	2,400,000 \$ 1,419,907
	Miscellaneous Fill	CY	\$	0.55	980,000 \$ 543,558
	Sand and Gravel Fill	CY	\$	0.52	910,000 \$ 471,084
	Furnish and Place Riprap	CY	\$	31.64	180,000 \$ 5,695,200
	Furnish and Place Rock Surfacing on Downstream Slope	CY	\$	7.40	86,000 \$ 636,000
	Treatment to Correct Seepage	LS	\$	3,697,674	JOB \$ 3,697,674
	Montgomery Dam Costs				\$ 25,913,806
	Dikes (20%)	LS			\$ 5,182,761
		Subtotal			\$ 31,096,567
V.	<b>SPILLWAY</b>				
	Excavation, All Classes, Open Cut	CY	\$	3.38	27,000 \$ 91,260
	Furnish and Place Riprap	CY	\$	31.64	1,150 \$ 36,386
	Special Compaction	CY	\$	16.69	570 \$ 9,515
	Pervious Backfill Around Structures	CY	\$	8.17	5,150 \$ 42,076
	Concrete in Inlet Structure	CY	\$	365.24	137 \$ 50,038
	Concrete in Conduit	CY	\$	366.49	208 \$ 76,230
	Concrete in Chute and Stilling Basin	CY	\$	365.24	835 \$ 304,975
	Concrete in 12-inch Exit Channel Lining	CY	\$	80.00	255 \$ 20,400
	Concrete in 4-inch Canal Lining	CY	\$	80.00	205 \$ 16,400
	Rubber Waterstop, 6-inch	LF	\$	16.69	510 \$ 8,513
	Chain-link Fence	LF	\$	19.08	350 \$ 6,677
	Air Inlet Piping	LB	\$	2.38	1,100 \$ 2,623
		Subtotal			\$ 665,093
VI.	<b>OUTLET WORKS</b>				
	Excavation, All Classes, Open Cut	CY	\$	6.76	286,000 \$ 1,933,360

## APPENDIX A 6.1

**Description:****MONTGOMERY RESERVOIR****FACILITY GROUPING: STORAGE  
CODE: CRMO02**

<b>ITEM No.</b>	<b>ITEM</b>	<b>UNIT<sup>a</sup></b>	<b>UNIT COST</b>	<b>QUANTITY</b>	<b>ITEM COST</b>
	Furnish and Place Riprap	CY \$	31.64	5,350	\$ 169,274
	Pervious Backfill Around Structures	CY \$	18.99	23,000	\$ 436,770
	Special Compaction	CY \$	16.69	3,780	\$ 63,097
	Concrete in Inlet Lining	CY \$	321	600	\$ 192,408
	Concrete in Intake Structure	CY \$	340	3,200	\$ 1,086,400
	Concrete in Upstream Conduit	CY \$	321	2,730	\$ 875,456
	Concrete in Downstream Conduit	CY \$	321	3,680	\$ 1,180,102
	Concrete in Access House	CY \$	340	130	\$ 44,135
	Concrete in Anchor Blocks	CY \$	256	4,600	\$ 1,178,290
	Concrete in Chute and Stilling Basin	CY \$	365	3,100	\$ 1,132,244
	Concrete in Bridge Deck	CY \$	424	123	\$ 52,092
	Concrete in Bridge Piers	CY \$	363	800	\$ 290,008
	6-inch Soil Pipe Drain	LF \$	23.38	980	\$ 22,916
	Type "B" Rubber Waterstops	LF \$	16.69	1,910	\$ 31,882
	Trashracks	LB \$	3.63	225,000	\$ 816,750
	Stop-log Seats and Guides at Intake Structure	LB \$	3.63	22,000	\$ 79,860
	Stop-logs at Intake Structure	LB \$	1.28	50,000	\$ 64,027
	17-ft by 22.5-ft Fixed Wheel Gate	LB \$	3.90	124,000	\$ 483,265
	Fixed Wheel Gate Frames and Guides	LB \$	2.78	56,300	\$ 156,727
	Fixed Wheel Gate Hoist	LB \$	5.68	30,000	\$ 170,368
	Fixed Wheel Gate Control	LB \$	11.97	2,500	\$ 29,926
	Miscellaneous Metalwork	LB \$	3.63	2,000	\$ 7,260
	Reservoir Level Gage, Floatwell, and Piping	LB \$	5.57	8,000	\$ 44,541
	Steel Girder Bridge Metalwork at Intake Structure	LB \$	1.45	60,000	\$ 86,854
	Chain-link Fence	LF \$	19.08	1,220	\$ 23,274
	17-ft Diameter Steel Pipe and Liner	LB \$	1.95	945,000	\$ 1,841,473
	9.5-ft Diameter Steel Outlet Pipes (2 Total)	LB \$	1.67	115,000	\$ 192,081
	7.5-ft by 9-ft Outlet Gates (4 Total)	LB \$	3.17	440,000	\$ 1,396,346
	Outlet Gate Controls	LB \$	11.97	3,500	\$ 41,896
	Stop-log Seats and Guides at Control Structure	LB \$	3.63	6,000	\$ 21,780
	Stop-logs at Control Structure	LB \$	1.28	14,000	\$ 17,928
	Gravel Surfacing (4-inch)	CY \$	22.27	400	\$ 8,908
	<b>Subtotal</b>				<b>\$ 14,171,698</b>
<b>VI.</b>	<b>CONVEYANCE FACILITIES</b>				
	Reservoir Supply Pipeline	LS \$	16,485,149	JOB	\$ 16,485,149
	Pumping Plant	LS \$	32,054,400	JOB	\$ 32,054,400
	Discharge Pipeline	LS \$	17,584,158	JOB	\$ 17,584,158
	Main Canal Pipeline	LS \$	5,495,050	JOB	\$ 5,495,050
	<b>Subtotal</b>				<b>\$ 71,618,757</b>

**CONSTRUCTION ESTIMATE****155,926,343**

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**\*NOTES:** The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

<sup>a</sup>CY=cubic yard; LB=pound; LS=lump sum; LF=linear foot; MI=mile; AC=acre

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 816,705,373  
Revision Date: October-96

## SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

Description: LOS BANOS GRANDES RESERVOIR - 2.03 MAF ALTERNATIVE

FACILITY GROUPING: STORAGE  
CODE: FRLB20

ITEM No.	ITEM	UNITa	UNIT COST	QUANTITY	ITEM COST
I.	<b>Los Banos Grandes Dam</b>				
	Dam Embankment	LS \$	101,418,252	JOB	\$ 101,418,252
	Spillway and Emergency Outlet Works	LS \$	15,193,382	JOB	\$ 15,193,382
	Dam Inlet - Outlet Works	LS \$	79,288,134	JOB	\$ 79,288,134
	General Reservoir Costs	LS \$	16,982,079	JOB	\$ 16,982,079
	<b>Subtotal</b>				\$ 212,881,846
II.	<b>Saddle Dams</b>				
	Salt Creek Saddle Dam	LS \$	120,626,719	JOB	\$ 120,626,719
	Salt Creek Saddle Dam Outlet Works	LS \$	1,537,520	JOB	\$ 1,537,520
	Harper Lane Saddle Dam	LS \$	6,990,536	JOB	\$ 6,990,536
	San Carlos Saddle Dam	LS \$	8,484,810	JOB	\$ 8,484,810
	<b>Subtotal</b>				\$ 137,639,585
III.	<b>Los Banos Detention Reservoir</b>				
	Dam Embankment Modifications	LS \$	1,559,843	JOB	\$ 1,559,843
	Dam Spillway	LS \$	15,452,655	JOB	\$ 15,452,655
	Dam Inlet - Outlet Works	LS \$	26,691,385	JOB	\$ 26,691,385
	<b>Subtotal</b>				\$ 43,703,883
IV.	<b>Access Roads</b>				
	Reach 1 - Jasper Sears (upgraded)	LS \$	1,003,907	JOB	\$ 1,003,907
	Reach 2 - P/G Plant No. 2 Access	LS \$	8,073,674	JOB	\$ 8,073,674
	Reach 3 - Main Dam Crest Access	LS \$	636,279	JOB	\$ 636,279
	Reach 3A - Main Dam Crest Access (Secondary)	LS \$	924,961	JOB	\$ 924,961
	Reach 4 - Salt Creek Saddle Dam Access	LS \$	1,431,628	JOB	\$ 1,431,628
	Reach 5 - P/G Plant 1 & 2 Connecting	LS \$	4,832,186	JOB	\$ 4,832,186
	Reach 6 - Salt Creek Saddle Dam Service	LS \$	1,624,868	JOB	\$ 1,624,868
	<b>Subtotal</b>				\$ 18,527,504
V.	<b>Future Recreation Roads</b>				
	Reach 7 - Chilaneo Creek Recreation	LS \$	2,216,372	JOB	\$ 2,216,372
	Reach 8 - Basalt Hill to Relocated Billy Wright	LS \$	2,414,326	JOB	\$ 2,414,326
	<b>Subtotal</b>				\$ 4,630,698
VI.	<b>Road Relocations</b>				
	Billy Wright	LS \$	6,388,713	JOB	\$ 6,388,713
	<b>Subtotal</b>				\$ 6,388,713
VII.	<b>Pumping - Generating Facilities</b>				
	Plant No. 1 (Q=4,500cfs, TDH=126, eff=75%, 85,770 HP)				
	Structure, Equipment, and Electrical, Complete	LS \$	97,064,800	JOB	\$ 97,064,800
	Penstocks	LS \$	8,345,736	JOB	\$ 8,345,736
	Plant No. 2 (Q=4,500cfs, TDH=403, eff=75%, 274,340 HP)				
	Structure, Equipment, and Electrical, Complete	LS \$	194,130,400	JOB	\$ 194,130,400
	Penstocks	LS \$	8,489,670	JOB	\$ 8,489,670
	<b>Subtotal</b>				\$ 308,030,607

APPENDIX A 7.1

Description:

**LOS BANOS GRANDES RESERVOIR, 2.03 MAF ALTERNATIVE****FACILITY GROUPING: STORAGE  
CODE: FRLB20**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST	QUANTITY	ITEM COST
VIII.	<b>Conveyance Channels</b>				
	Conveyance Channel No. 1	LS \$	19,703,488	JOB	\$ 19,703,488
	Conveyance Channel No. 2	LS \$	8,299,544	JOB	\$ 8,299,544
	<b>Subtotal</b>				\$ 28,003,031
IX.	<b>Emergency Release Distribution Facilities</b>				
	Conveyance Channel No. 1	LS \$	1,013,408	JOB	\$ 1,013,408
	Garzas Weir	LS \$	1,157,603	JOB	\$ 1,157,603
	Orestimba Outlet	LS \$	879,794	JOB	\$ 879,794
	Salt Creek Weir @ California Aqueduct	LS \$	738,616	JOB	\$ 738,616
	Salt Creek Weirs @ Delta Mendota Canal	LS \$	1,837,515	JOB	\$ 1,837,515
	<b>Subtotal</b>				\$ 5,626,936
X.	<b>Utility Relocations</b>				
	PG&E 500 kV Electrical Line	LS \$	4,098,670	JOB	\$ 4,098,670
	20-Inch Texaco Oil Line	LS \$	297,504	JOB	\$ 297,504
	I-5 Pipelines	LS \$	347,149	JOB	\$ 347,149
	<b>Subtotal</b>				\$ 4,743,324
XI.	<b>Initial Recreation Development</b>	LS \$	16,482,247	JOB	\$ 16,482,247
XII.	<b>Rights-of-Way</b>	LS \$	30,047,000	JOB	\$ 30,047,000

**CONSTRUCTION ESTIMATE**

\$ 816,705,373

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**\*NOTES:** The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
 Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

<sup>a</sup>LS=lump sum

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 1,124,087,311  
Revision Date: October-96

## SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

Description:

LOS VAQUEROS RESERVOIR ENLARGEMENT

**FACILITY GROUPING: STORAGE**  
**CODE: FRLV10**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST*	QUANTITY	ITEM COST
<b>LOS VAQUEROS DAM AND RESERVOIR</b>					
I.	<b>MOBILIZATION</b>	LS	\$ 1,000,000	JOB	\$ 1,000,000
II.	<b>DEMOLITION OF SPILLWAY &amp; INTAKE STRUCT.</b>	LS	\$ 500,000	JOB	\$ 500,000
III.	<b>REMOVE EXISTING DAM &amp; STOCKPILE MAT'L'S</b>	CY	\$ 3.00	2,700,000	\$ 8,100,000
IV.	<b>LAND ACQUISITION</b>	AC	\$ 3,500	6,400	\$ 22,400,000
V.	<b>RESERVOIR CLEARING</b>	AC	\$ 1,097	340	\$ 372,980
VI.	<b>MAIN DAM</b>				
	Stripping/Excavation	CY	\$ 1.76	3,920,000	\$ 6,899,200
	Foundation Preparation	SY	\$ 0.68	609,000	\$ 414,120
	Foundation Special Treatment		\$ 1.37	426,300	\$ 584,031
	Dewatering	LS	\$ 343,000	JOB	\$ 343,000
	Impervious Core	CY	\$ 6.63	8,140,000	\$ 53,968,200
	Filter & Drain	CY	\$ 27.50	3,330,000	\$ 91,575,000
	Sandstone & Shale	CY	\$ 6.85	21,630,000	\$ 148,165,500
	Pit Run	CY	\$ 11.70	1,520,000	\$ 17,784,000
	Riprap & Bedding	CY	\$ 42.50	887,000	\$ 37,697,500
	Grout Curtain				
	Drill Holes	LF	\$ 3.02	120,600	\$ 364,212
	Grout	SKS	\$ 18.60	60,300	\$ 1,121,580
	Consolidation Grout				
	Drill Holes	LF	\$ 3.26	33,500	\$ 109,210
	Grout	SKS	\$ 21.70	20,100	\$ 436,170
	Instrumentation	LS	\$ 143,000	JOB	\$ 143,000
	<b>Subtotal</b>				<b>\$ 359,604,723</b>
VII.	<b>SADDLE DAMS</b>				
	Stripping/Excavation	CY	\$ 1.76	1,036,000	\$ 1,823,360
	Foundation Preparation	SY	\$ 0.68	161,000	\$ 109,480
	Foundation Special Treatment	SY	\$ 1.37	113,000	\$ 154,810
	Impervious Core	CY	\$ 6.63	734,000	\$ 4,866,420
	Filter & Drain	CY	\$ 27.50	300,000	\$ 8,250,000
	Sandstone & Shale	CY	\$ 6.85	1,950,000	\$ 13,357,500
	Pit Run	CY	\$ 11.70	137,000	\$ 1,602,900
	Riprap & Bedding	CY	\$ 42.50	80,000	\$ 3,400,000
	Grout Curtain				
	Drill Holes	LF	\$ 3.02	28,000	\$ 84,560
	Grout	SKS	\$ 18.60	14,000	\$ 260,400
	Consolidation Grout				
	Drill Holes	LF	\$ 3.26	7,800	\$ 25,428
	Grout	SKS	\$ 21.70	4,700	\$ 101,990
	<b>Subtotal</b>				<b>\$ 34,036,848</b>

APPENDIX A 8.1

Description:

**LOS VAQUEROS RESERVOIR ENLARGEMENT**
**FACILITY GROUPING: STORAGE**  
**CODE: FRLV10**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST*	QUANTITY	ITEM COST
<b>VIII. SPILLWAY</b>					
Excavation	CY	\$ 4.72	438,000	\$	2,067,360
Slope Protection	SY	\$ 16.00	41,000	\$	656,000
Riprap (Exit Channel)	CY	\$ 42.50	27,000	\$	1,147,500
Riprap Bedding	CY	\$ 42.50	14,000	\$	595,000
Control Structure Concrete	CY	\$ 378	6,900	\$	2,608,200
Chute Concrete	CY	\$ 378	18,000	\$	6,804,000
Stilling Basin Concrete	CY	\$ 378	11,000	\$	4,158,000
	<b>Subtotal</b>			\$	<b>18,036,060</b>
<b>IX. OUTLET WORKS</b>					
Excavation	CY	\$ 4.72	56,000	\$	264,320
Slope Protection	SY	\$ 16.00	8,000	\$	128,000
Outlet Tunnel	LF	\$ 1,698	4,000	\$	6,792,000
Cut and Cover Conduit	LF	\$ 2,075	310	\$	643,250
Steel Liner	LF	\$ 1,415	2,800	\$	3,962,000
Middle Outlet Tunnel	LF	\$ 1,698	1,036	\$	1,759,128
Upper Outlet Tunnel	LF	\$ 1,698	725	\$	1,231,050
Shaft	LF	\$ 3,396	660	\$	2,241,360
Shaft House Concrete	CY	\$ 378	660	\$	249,480
Control House Concrete	CY	\$ 378	1,000	\$	378,000
Stilling Basin Concrete	CY	\$ 378	1,500	\$	567,000
Wheel Gate (In Shaft)	EA	\$ 188,000	4	\$	752,000
Control Gates (In Control House)	EA	\$ 142,000	2	\$	284,000
Guard Gates (In Control House)	EA	\$ 142,000	2	\$	284,000
Bifurcations	LBS	\$ 3.78	35,000	\$	132,300
Trashracks and Misc. Metal	LBS	\$ 1.88	32,000	\$	60,160
Electrical	LS	\$ 283,000	JOB	\$	283,000
Riprap Bedding	CY	\$ 42.50	4,000	\$	170,000
Riprap	CY	\$ 42.50	8,000	\$	340,000
	<b>Subtotal</b>			\$	<b>20,521,048</b>
<b>FACTOR FOR EMERGENCY RELEASE = 2.29</b>					
<b>Adjusted Subtotal</b>					
<b>X. ACCESS ROADS</b>		LF	\$ 65.00	9,900	\$ <b>643,500</b>
	<b>Subtotal Los Vaqueros Dam and Reservoir</b>			\$	<b>491,687,311</b>
<b>KELLOGG FOREBAY</b>					
<b>XI. LAND ACQUISITION</b>		AC	\$ 3,500	164	\$ <b>574,000</b>
<b>XII. RESERVOIR CLEARING</b>		AC	\$ 1,097	13	\$ <b>14,261</b>
<b>XIII. MAIN DAM</b>					
Stripping/Excavation	CY	\$ 1.76	146,000	\$	256,960
Foundation Preparation	SY	\$ 0.68	23,000	\$	15,640
Foundation Special Treatment	SY	\$ 1.37	16,000	\$	21,920
Dewatering	LS	\$ 15,000	JOB	\$	15,000
Impervious Core	CY	\$ 6.63	92,000	\$	609,960
Filter & Drain	CY	\$ 27.50	38,000	\$	1,045,000
Sandstone & Shale	CY	\$ 6.85	244,000	\$	1,671,400
Pit Run	CY	\$ 11.70	17,000	\$	198,900
Riprap & Bedding	CY	\$ 42.50	10,000	\$	425,000
Grout Curtain					

**APPENDIX A 8.2**

Description:

**LOS VAQUEROS RESERVOIR ENLARGEMENT****FACILITY GROUPING: STORAGE  
CODE: FRLV10**

ITEM No.	ITEM	UNIT*	UNIT COST*	QUANTITY	ITEM COST
	Drill Holes	LF	\$ 3.02	3,400	\$ 10,268
	Grout	SKS	\$ 18.60	1,700	\$ 31,620
	Consolidation Grout				
	Drill Holes	LF	\$ 3.26	1,000	\$ 3,260
	Grout	SKS	\$ 21.70	600	\$ 13,020
		<b>Subtotal</b>			<b>\$ 4,317,948</b>
<b>XIV.</b>	<b>SADDLE DAMS</b>				
	Stripping/Excavation	CY	\$ 1.76	56,000	\$ 98,560
	Foundation Preparation	SY	\$ 0.68	8,700	\$ 5,916
	Foundation Special Treatment	SY	\$ 1.37	6,100	\$ 8,357
	Impervious Core	CY	\$ 6.63	31,000	\$ 205,530
	Filter & Drain	CY	\$ 27.50	13,000	\$ 357,500
	Sandstone & Shale	CY	\$ 6.85	82,215	\$ 563,173
	Pit Run	CY	\$ 11.70	5,800	\$ 67,860
	Riprap & Bedding	CY	\$ 42.50	3,400	\$ 144,500
	Grout Curtain				
	Drill Holes	LF	\$ 3.02	900	\$ 2,718
	Grout	SKS	\$ 18.60	450	\$ 8,370
	Consolidation Grout				
	Drill Holes	LF	\$ 3.26	250	\$ 815
	Grout	SKS	\$ 21.70	150	\$ 3,255
		<b>Subtotal</b>			<b>\$ 1,466,554</b>
<b>XV.</b>	<b>SPILLWAY</b>				
	Excavation	CY	\$ 4.72	67,000	\$ 316,240
	Slope Protection	SY	\$ 16.00	6,300	\$ 100,800
	Riprap (Exit Channel)	CY	\$ 42.50	4,200	\$ 178,500
	Riprap Bedding	CY	\$ 42.50	2,100	\$ 89,250
	Control Structure Concrete	CY	\$ 378	1,100	\$ 415,800
	Chute Concrete	CY	\$ 378	2,700	\$ 1,020,600
	Stilling Basin Concrete	CY	\$ 378	1,700	\$ 642,600
		<b>Subtotal</b>			<b>\$ 2,763,790</b>
<b>XVI.</b>	<b>OUTLET WORKS</b>				
	Excavation	CY	\$ 4.72	56,000	\$ 264,320
	Slope Protection	SY	\$ 16.00	8,000	\$ 128,000
	Outlet Tunnel	LF	\$ 1,698	670	\$ 1,137,660
	Cut and Cover Conduit	LF	\$ 2,075	50	\$ 103,750
	Steel Liner	LF	\$ 1,415	470	\$ 665,050
	Middle Outlet Tunnel	LF	\$ 1,698	170	\$ 288,660
	Upper Outlet Tunnel	LF	\$ 1,698	120	\$ 203,760
	Shaft	LF	\$ 3,396	105	\$ 356,580
	Shaft House Concrete	CY	\$ 378	105	\$ 39,690
	Control House Concrete	CY	\$ 378	1,000	\$ 378,000
	Stilling Basin Concrete	CY	\$ 378	1,500	\$ 567,000
	Wheel Gate (In Shaft)	EA	\$ 188,000	4	\$ 752,000
	Control Gates (In Control House)	EA	\$ 142,000	2	\$ 284,000
	Guard Gates (In Control House)	EA	\$ 142,000	2	\$ 284,000
	Bifurcations	LBS	\$ 3.78	35,000	\$ 132,300
	Trashracks and Misc. Metal	LBS	\$ 1.88	32,000	\$ 60,160
	Electrical	LS	\$ 283,000	JOB	\$ 283,000
	Riprap Bedding	CY	\$ 42.50	4,000	\$ 170,000
	Riprap	CY	\$ 42.50	8,000	\$ 340,000
		<b>Subtotal</b>			<b>\$ 6,437,930</b>

FACTOR FOR EMERGENCY RELEASE = 0.29

## APPENDIX A 8.3

Description:

**LOS VAQUEROS RESERVOIR ENLARGEMENT**
**FACILITY GROUPING: STORAGE**  
**CODE: FRLV10**

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST*	QUANTITY	ITEM COST
<b>Adjusted Subtotal</b>					<b>\$ 1,867,000</b>
XVII.	ACCESS ROADS	LF	\$ 65.00	300	\$ 19,500
<b>Subtotal Kellog Forebay</b>					<b>\$ 11,000,000</b>
<b>CONVEYANCE FACILITIES</b>					
XVIII.	LOS VAQUEROS PIPELINE (Q=5,000 CFS) - 9 BARREL	LF	\$ 720	99,000	\$ 71,280,000
XIX.	LOS VAQUEROS PUMPING-GENERATING PLANT (Q=5,000 cfs, TDH=552 ft., HP = 418,000)	LS	\$ 250,400,000	JOB	\$ 250,400,000
XX.	TUWAY CANAL (Q=5,000CFS)				
	Canal				
	Excavation	CY	\$ 2.00	4,066,000	\$ 8,132,000
	Compacted Embankment	CY	\$ 0.80	183,000	\$ 146,400
	Common Embankment	CY	\$ 0.50	155,000	\$ 77,500
	Clearing and Grubbing	SF	\$ 0.03	8,767,000	\$ 219,175
	Concrete Lining	CY	\$ 80.00	37,900	\$ 3,032,000
	Operating Road-Gravel Surfacing	TONS	\$ 11.20	10,200	\$ 114,240
	Siphons				
	Siphon	CY	\$ 600	51,000	\$ 30,600,000
	Inlet and Outlet Transitions	CY	\$ 600	3,500	\$ 2,100,000
	Outlet Works Facility				
	Check Structure	CY	\$ 600	1,170	\$ 702,000
	Concrete	CY	\$ 600	3,250	\$ 1,950,000
	Radial Gates (25ft x 55ft)	EA	\$ 690,000	3	\$ 2,070,000
	Outlet Structure Concrete	CY	\$ 600	1,700	\$ 1,020,000
	144" Dia. Pipe	LF	\$ 720	900	\$ 648,000
	Control Building	SF	\$ 150	1,000	\$ 150,000
	Electrical Installation	LS	\$ 500,000	JOB	\$ 500,000
	Misc. Metalwork	LS	\$ 150,000	JOB	\$ 150,000
	Cofferdam Sheetpiling	SF	\$ 28.00	50,300	\$ 1,408,400
	Cofferdam Gravel Fill	CY	\$ 21.00	9,310	\$ 195,510
	Land Acquisition				
	Canal	AC	\$ 3,500	330	\$ 1,155,000
	Pipeline	AC	\$ 3,500	80	\$ 280,000
	<b>Subtotal</b>				
					<b>\$ 54,650,225</b>
XXI.	NORTH SAN JOAQUIN INTAKE CHANNEL WIDENING				
	Cofferdam Sheetpiling	SF	\$ 28.00	2,513,000	\$ 70,364,000
	Cofferdam Gravel Fill	CY	\$ 21.00	465,000	\$ 9,765,000
	Excavation	CY	\$ 3.00	850,000	\$ 2,550,000
	Salvage Riprap and Replace on New Sideslope	LS	\$ 1,800,000	JOB	\$ 1,800,000
	<b>Subtotal</b>				
					<b>\$ 84,479,000</b>
XXII.	KELLOGG PUMPING PLANT				
	Pumping Plant (Q=5,000cfs, TDH=255ft, HP=193,000)	LS	\$ 135,200,000	JOB	\$ 135,200,000
XXIII.	KELLOGG PUMPING PLANT DISCHARGE FACILITY				
	144" Dia. Pipeline	LF	\$ 720	28,800	\$ 20,736,000
	Canal	LF	\$ 570	1,000	\$ 570,000
	Check Structure				
	Concrete	CY	\$ 600	3,250	\$ 1,950,000

APPENDIX A 8.4

Description:

**LOS VÁQUEROS RESERVOIR ENLARGEMENT**

FACILITY GROUPING: STORAGE  
CODE: FRLV10

ITEM No.	ITEM	UNIT <sup>a</sup>	UNIT COST*	QUANTITY	ITEM COST
	Radial Gates (25ft x 55ft)	EA	\$ 690,000	3	\$ 2,070,000
	Land Acquisition				
	Canal	AC	\$ 3,500	14	\$ 49,000
	Pipeline	AC	\$ 3,500	14	\$ 49,000
	Subtotal				\$ 25,424,000
	Subtotal Conveyance Facilities				\$ 25,424,000
	<b>CONSTRUCTION ESTIMATE</b>				<b>\$ 25,424,087.311</b>

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**\*NOTES:** The Unit Cost value was generated by Bookman-Edmonston and based on the USBR index according to the following formula:  
Unit Cost New = (USBR New / USBR Previous) \* Unit Cost Previous

<sup>a</sup>CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre

#### APPENDIX A 8.5

## **APPENDIX B**

### **MAJOR RESERVOIR CONVEYANCE FACILITY COMPONENTS BASE CONSTRUCTION ESTIMATES**

**MAJOR RESERVOIR CONVEYANCE FACILITIES**

<b>DESCRIPTION</b>	<b>PAGE</b>
(2a2) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) -- Screened Pump Alternative	<b>B 1.1 - B 1.2</b>
(2e2) Enlarge existing T-C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2) -- Screened Pump Alternative	<b>B 2.1 - B 2.2</b>
Chico Landing Intertie	<b>B 3.1 - B 3.2</b>

**TABLE B****APENDIX B**

4/29/98

DRAFT

APENDIX B

D - 0 1 0 4 8 9

D-010489

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$236,891,368  
Revision Date: October-96

### MAJOR CONVEYANCE

Description: (2a2) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) -- Screened Pump  
Alternative

FACILITY GROUPING: CONVEYANCE  
CODE: BCTCA2

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	Land Acquisition	AC	\$3,500	17	\$59,500
II.	Concrete Work Pumping Facility Discharge Channel	CY CY	\$600 \$600	17,300 3,470	\$10,380,000 \$2,082,000
		Subtotal			\$12,462,000
III.	Pumps and Motors (2,300 HP)	EA	\$1,150,000	10	\$11,500,000
IV.	Control House	SF	\$150	5,000	\$750,000
V.	Fish Screens	CFS	\$10,000	5,000	\$50,000,000
VI.	Discharge Piping	LBS	\$5.00	154,500	\$772,500
VII.	Electrical Work	LS	\$750,000	JOB	\$750,000
VIII.	Cofferdam Sheetpiling	SF	\$28.00	172,800	\$4,838,400
IX.	Cofferdam Gravel Fill	CY	\$21.00	32,000	\$672,000
X.	Misc. @ 10% (Trash racks, Grating, etc.)				\$8,180,440
XI.	RED BLUFF TO THOMES CREEK REACH 1: 11.4 MILES				
	Intake Works and Fish Screen	LS	\$5,000	2,500	\$12,500,000
	Enlargement of Canal	LF	\$184	54,000	\$9,936,000
	Modification of Coyote Creek Siphon with Check Structure	LS	\$2,500,000	JOB	\$2,500,000
	Modification of Oat Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of San Benito Ave. and S.P.R.R. Siphon	LS	\$2,000,000	JOB	\$2,000,000
	Modification of Elder Creek Siphon w/Check Structure	LS	\$2,500,000	JOB	\$2,500,000
	Modification of McClure Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Woodland Ave. and S.P.R.R. Siphon	LS		JOB	\$2,000,000
	Modification of Thomes Creek Siphon (Approx. 1,200' Long)	LS		JOB	\$4,600,000
	Modification of County Road Bridges	EA	\$485,000	5	\$2,425,000
	Modification of Farm Road Bridges	EA	\$285,000	4	\$1,140,000
	Modification of Utilities at Canal Structures	EA	\$10,000	9	\$90,000
	Subtotal				\$42,691,000
XII.	THOMES CREEK TO STONY CREEK REACH 2 : 17.3 MILES				
	Enlargement of Canal	LF	\$184	87,350	\$16,072,400
	Modification of Jewett Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Rice Creek Siphon (with S.P.R.R. Crossing)	LS	\$2,000,000	JOB	\$2,000,000
	Modification of Loleta Road Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Moore Creek Siphon (with S.P.R.R. Crossing)	LS	\$2,000,000	JOB	\$2,000,000
	Modification of County Road and Railroad Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Check Structure (Sta. 1331+00)	LS	\$1,100,000	JOB	\$1,100,000
	Modification of County Road Bridges	EA	\$485,000	12	\$5,820,000
	Modification of Farm Bridges	EA	\$285,000	3	\$855,000
	Modification of Utilities at Canal Structures	EA	\$10,000	8	\$80,000
	Subtotal				\$32,427,400

### APPENDIX B 1.1

## Description:

(2a2) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) -- Screened Pump  
**Alternative**

FACILITY GROUPING: CONVEYANCE  
 CODE: BCTCA2

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>XIII. STONY CREEK TO WILSON CREEK</b>					
<b>REACH 3 : 12.9 MILES</b>					
	Enlargement of Canal	LF	\$184	63,960	\$11,768,640
	Modification of Stony Creek Siphon (Approx. 800' Long)	LS	\$3,500,000	JOB	\$3,500,000
	Modification of Walker Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Wilson Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Hwy. I-5 Bridge - Northbound	SF	\$150	3,000	\$450,000
	Modification of Hwy. I-5 Bridge -Southbound	SF	\$150	3,000	\$450,000
	Modification of Check Structure (Sta. 1706+50)	LS	\$1,100,000	JOB	\$1,100,000
	Modification of State Hwy. Bridge (Sta. 1661+78)	LS	\$600,000	JOB	\$600,000
	Modification of County Road Bridges	EA	\$485,000	12	\$5,820,000
	Modification of Farm Road Bridges	EA	\$285,000	1	\$285,000
	Modification of Trapezoidal Wash Siphon	EA	\$300,000	2	\$600,000
	Modification of Utilities at Canal Structures	EA	\$10,000	10	\$100,000
	<b>Subtotal</b>				<b>\$27,673,640</b>
<b>XIV. WILSON CREEK TO LOGAN CREEK</b>					
<b>REACH 4 : 14.3 MILES</b>					
	Enlargement of Canal	LF	\$184	72,932	\$13,419,488
	Modification of French Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of South Fork Wilson Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Logan Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Check Structures		\$1,100,000	2	\$2,200,000
	Modification of State Hwy. 261 Bridge	LS	\$600,000	JOB	\$600,000
	Modification of County road Bridges		\$485,000	2	\$970,000
	Modification of Farm Road Bridges		\$285,000	6	\$1,710,000
	Modification of White Cobin Creek Undercrossing	LS	\$100,000	JOB	\$100,000
	Modification of Corral Creek Undercrossing	LS	\$100,000	JOB	\$100,000
	Modification of Hayes Hollow Creek Undercrossing	LS	\$100,000	JOB	\$100,000
	Modification of North Fork Wilson Creek Undercrossing	LS	\$100,000	JOB	\$100,000
	Modification of North Fork Logan Creek Undercrossing	LS	\$100,000	JOB	\$100,000
	Modification of Utilities at Canal Structures	LOC	\$10,000	12	\$120,000
	<b>Subtotal</b>				<b>\$24,019,488</b>
<b>XV. LOGAN CREEK TO FUNKS RESERVOIR</b>					
<b>REACH 5 : 10.8 MILES</b>					
	Enlargement of Canal	LF	\$184	56,250	\$10,350,000
	Modification of Hunters Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Check Structure	LS	\$1,100,000	JOB	\$1,100,000
	Modification of Dual Purpose Wasteway and Stilling Basin	LS	\$1,500,000	JOB	\$1,500,000
	Modification of County Road Bridge	EA	\$485,000	1	\$485,000
	Modification of Farm Bridges	EA	\$285,000	8	\$2,280,000
	Modification of Utilities at Canal Structures	EA	\$10,000	12	\$120,000
	<b>Subtotal</b>				<b>\$17,335,000</b>
<b>XVI. LANDS</b>					
Rights-of-way					
		AC	\$3,000	920	\$2,760,000
	<b>Subtotal</b>				<b>\$2,760,000</b>
<b>CONSTRUCTION ESTIMATE</b>					
<b>\$236,391,368</b>					

REFERENCES: 1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports, October 1997.

NOTES: CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$166,290,040  
Revision Date: October-96

## MAJOR CONVEYANCE

Description: (2e2) Enlarge existing T.C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2)  
Screened Pump Alternative

FACILITY GROUPING: CONVEYANCE  
CODE: BCTCE2

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	Land Acquisition	AC	\$3,500	17	\$59,500
II.	Concrete Work Pumping Facility Discharge Channel	CY CY	\$600 \$600	17,300 3,470	\$10,380,000 \$2,082,000
		Subtotal			\$12,462,000
III.	Pumps and Motors (2,300 HP)	EA	\$1,150,000	10	\$11,500,000
IV.	Control House	SF	\$150	5,000	\$750,000
V.	Fish Screens	CFS	\$10,000	5,000	\$50,000,000
VI.	Discharge Piping	LBS	\$5.00	154,500	\$772,500
VII.	Electrical Work	LS	\$750,000	JOB	\$750,000
VIII.	Cofferdam Sheetpiling	SF	\$28.00	172,800	\$4,838,400
IX.	Cofferdam Gravel Fill	CY	\$21.00	32,000	\$672,000
X.	Misc. @ 10% (Trash racks, Grating, etc.)				\$8,180,440
XI.	MODIFICATION OF INTAKE FACILITIES Modification of Intake Facilities with Fish Screen	LS	\$12,500,000	JOB	\$12,500,000
		Subtotal			\$12,500,000
XII.	RED BLUFF TO THOMES CREEK REACH 1: 11.4 MILES				
	Enlargement of Canal	LF	\$184	54,000	\$9,936,000
	Modification of Coyote Creek Siphon with Check Structure	LS	\$2,500,000	JOB	\$2,500,000
	Modification of Oat Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of San Benito Ave. and S.P.R.R. Siphon	LS	\$2,000,000	JOB	\$2,000,000
	Modification of Elder Creek Siphon w/Check Structure	LS	\$2,500,000	JOB	\$2,500,000
	Modification of McClure Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Woodland Ave. and S.P.R.R. Siphon	LS	\$2,000,000	JOB	\$2,000,000
	Modification of Thomes Creek Siphon (Approx. 1,200' Long)	LS	\$4,600,000	JOB	\$4,600,000
	Modification of County Road Bridges	EA	\$485,000	5	\$2,425,000
	Modification of Farm Road Bridges	EA	\$285,000	4	\$1,140,000
	Modification of Utilities at Canal Structures	EA	\$10,000	9	\$90,000
		Subtotal			\$30,191,000
XIII.	THOMES CREEK TO STONY CREEK REACH 2 : 17.3 MILES				
	Enlargement of Canal	LF	\$184	87,350	\$16,072,400
	Modification of Jewett Creek Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Rice Creek Siphon (with S.P.R.R. Crossing)	LS	\$2,000,000	JOB	\$2,000,000
	Modification of Loleta Road Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Moore Creek Siphon (with S.P.R.R. Crossing)	LS	\$2,000,000	JOB	\$2,000,000
	Modification of County Road and Railroad Siphon	LS	\$1,500,000	JOB	\$1,500,000
	Modification of Check Structure (Sta. 1331+00)	LS	\$1,100,000	JOB	\$1,100,000
	Modification of County Road Bridges	EA	\$485,000	12	\$5,820,000

## APPENDIX B 2.1

4/29/98

## PRELIMINARY COST SUMMARY

DRAFT

Description:

(2e2) Enlarge existing T-C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2) --  
 Screened Pump Alternative

FACILITY GROUPING: CONVEYANCE  
 CODE: BCTCE2

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Modification of Farm Bridges	EA	\$285,000	3	\$855,000
	Modification of Utilities at Canal Structures	EA	\$10,000	8	\$80,000
	Subtotal				<b>\$32,427,400</b>
XIV.	LANDS				
	Rights-of-way	AC	\$3,000	920	\$2,760,000
	Reaches 1-2 account for 43% of total lands: (.43 * \$2,760,000)				
	Adjusted Subtotal				<b>\$1,186,800</b>
					<b>\$166,290,040</b>

REFERENCES: 1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports, October 1997.

NOTES: CY=cubic yard; LB=pound; EA=each; LS=lump sum; LF=linear foot; SF=square foot; TON=ton; MI=mile; AC=acre

## APPENDIX B 2.2

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$ 252,678,000  
Revision Date: October-96

### MAJOR CONVEYANCE

Description:

Chico Landing Intertie

FACILITY GROUPING: CONVEYANCE  
CODE: BCCLIN

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. RIVER TURNTOUT</b>					
Structural Concrete					
Intake structure	CY	\$ 600.00	5,470	\$	3,282,000
Meter vault	CY	\$ 600.00	1,406	\$	843,600
Outlet structure	CY	\$ 600	769	\$	461,400
120" dia. pipe	LF	\$ 600.00	1,500	\$	900,000
120" sluice gate with operator	EA	\$ 80,000.00	10	\$	800,000
120" sonic meter	EA	\$ 10,000.00	10	\$	100,000
Control building 30'x50'	SF	\$ 150	1,500	\$	225,000
Electrical installation	LS	\$ 500,000	JOB	\$	500,000
Miscellaneous metal works	LS	\$ 150,000	JOB	\$	150,000
Cofferdam and dewatering	LS	\$ 1,000,000	JOB	\$	1,000,000
Fish Screen	CFS	\$ 10,000.00	5,000	\$	50,000,000
	<b>Subtotal</b>				<b>\$ 58,262,000</b>
<b>II. PUMPING PLANT NO. 1 (Q=5,000 CFS, TDH=35FT, eff=75%, 26,470 HP)</b>					
Structure, Equipment, and Electrical Complete	LS	\$ 47,477,600		JOB	\$ 47,477,600
	<b>Subtotal</b>				<b>\$ 47,477,600</b>
<b>III. PUMPING PLANTS NO. 2 &amp; NO. 3 (Q=5,000 CFS, TDH=40FT, eff=75%, 30,250 HP)</b>					
Structure, Equipment, and Electrical Complete	LS	\$ 51,697,600		JOB	\$ 51,697,600
Subtotal per Plant	LS	\$ 51,697,600		JOB	\$ 51,697,600
	<b>Subtotal</b>				<b>\$ 103,395,200</b>
<b>IV. S.P.R.R. BORED SIPHON</b>					
6-144" dia. pipe	LF	\$ 36,000.00	80	\$	2,880,000
Structural Concrete (Headwalls)	CY	\$ 600.00	350	\$	210,000
Concrete transitions	EA	\$ 510,000.00	2	\$	1,020,000
	<b>Subtotal</b>				<b>\$ 4,110,000</b>
<b>V. GLENN-COLUSA CANAL SIPHON</b>					
Open-cut double 20'x20' box	LF	\$ 5,000.00	200	\$	1,000,000
Concrete transitions	EA	\$ 582,000.00	2	\$	1,164,000
Temporary shootfly and restoration of Glenn-Colusa					
Canal Siphon	LS	\$ 500,000.00		Job	\$ 500,000
	<b>Subtotal</b>				<b>\$ 2,664,000</b>
<b>VI. BRIDGES (180' x 42')</b>					
County bridges	EA	\$ 693,000.00	4	\$	2,772,000
County bridge with approach	EA	\$ 759,000.00	5	\$	3,795,000
	<b>Subtotal</b>				<b>\$ 6,567,000</b>
<b>VII. IRRIGATION CROSSINGS (9 Crossings @ 350')</b>					
36" dia. RCP	LF	\$ 108.00	3,150	\$	340,200
Transitions	EA	\$ 5,000	18	\$	90,000
	<b>Subtotal</b>				<b>\$ 430,200</b>
<b>VIII. OUTLET STRUCTURE TO TEHAMA-COLUSA (T-C) CANAL</b>					
Transition~canal to pipes	LS	\$ 425,000.00		JOB	\$ 425,000

### APPENDIX B 3.1

Description:

**Chico Landing Intertie**

**FACILITY GROUPING: CONVEYANCE**  
**CODE: BCCLIN**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	144" Dia pipe (6 Barrels @ (100 FT)	LF	\$ 864.00	600	\$ 518,400
	Structural concrete	CY	\$ 600.00	500	\$ 300,000
	Cofferdam and dewatering	LS	\$ 300,000.00	Job	\$ 300,000
		Subtotal			\$ 1,543,400
<b>IX.</b>	<b>CANAL (Q=5,000 CFS, Bottom Width=60', Depth=21', Sideslope=1.5:1)</b>				
	Reach 1: Sacramento River to P.P. No. 1				
	Canal in cut	LF	\$ 296.00	6,000	\$ 1,776,000
	Reach 2: P.P. No. 1 to P.P. No. 2				
	Canal in fill	LF	\$ 397.00	12,200	\$ 4,843,400
	Canal in cut	LF	\$ 296.00	10,000	\$ 2,960,000
	Reach 3: P.P. No. 2 to P.P. No. 3				
	Canal in fill	LF	\$ 397.00	9,000	\$ 3,573,000
	Canal in cut	LF	\$ 296.00	13,000	\$ 3,848,000
	Reach 4: P.P. No. 3 to T-C Canal				
	Canal in fill	LF	\$ 397.00	7,400	\$ 2,937,800
	Concrete Lining	CY	\$ 80.00	85,630	\$ 6,850,400
		Subtotal			\$ 26,788,600
<b>X.</b>	<b>RIGHTS-OF-WAY</b>				
	Rights-of-way - Canals	AC	\$ 3,000.00	470	\$ 1,410,000
	Rights-of-way - Sacramento River Diversion	AC	\$ 3,000.00	10	\$ 30,000
		Subtotal			\$ 1,440,000

**CONSTRUCTION ESTIMATE****\$ 252,678,000**

**REFERENCES:** 1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Description and Cost Estimate Reports*, October 1997.

**NOTES:** <sup>a</sup>EA=each; LF=linear foot; LS=lump sum; CY=cubic yard; AC=acre; EA=each; SF=square foot;  
 CFS=cubic foot per second

<sup>b</sup>All unit costs were developed by Bookman-Edmonston Engineering, with the exception of rights-of-way costs.  
 Rights-of-way costs were developed by the Bureau of Reclamation, Land Resources Branch, 1997.

**APPENDIX B 3.2**

## **APPENDIX C**

### **DELTA CONVEYANCE FACILITY COMPONENTS**

### **BASE CONSTRUCTION ESTIMATES**

## DELTA CONVEYANCE FACILITIES

<b>FACILITY GROUP</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
CVP-SWP IMPROVEMENTS	New fish screens at Skinner, new fish screens at Tracy, and an interite for Tracy and CCFB	<b>C 1.1</b>
	New fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an interite for Tracy and CCFB	<b>C 2.1</b>
NORTH DELTA IMPROVEMENTS	10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin	<b>C 3.1 - C 3.3</b>
	North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin	<b>C 4.1 - C 4.2</b>
	East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten	<b>C 5.1 - C 5.5</b>
	West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack	<b>C 6.1 - C 6.4</b>
SOUTH DELTA IMPROVEMENTS	Typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers	<b>C 7.1</b>
	NO Dredging including Operable Fish Barrier, and three Flow Barriers	<b>C 8.1</b>
	Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB	<b>C 9.1 - C 9.3</b>
	One Operable Fish Barrier ONLY	<b>C 10.1</b>
MULTIPLE INTAKES	Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood	<b>C 11.1 - C 11.8</b>
ISOLATED FACILITY	5,000 cfs Isolated Open Channel Facility with a diversion at Hood	<b>C 12.1 - C 12.4</b>
	15,000 cfs Isolated Open Channel Facility with a Diversion at Hood	<b>C 13.1 - C 13.4</b>
IN-DELTA STORAGE	Flooding of Victoria, Woodward and Bacon Islands, syphons used to convey water through interior canals	<b>C 14.1 - C 14.3</b>

**TABLE C**

## APPENDIX C

4/29/98

## PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 174,500,000  
Last Update November 3, 1997

**CVP-SWP IMPROVEMENTS**

Description: CVP-SWP Improvements including a new fish screen at Skinner, new fish screens at Tracy, and intertie for Tracy and CCFB

**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: KCOLD**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	New fish Screen at Skinner	CFS \$	10,000.00	10,300	\$ 103,000,000
	SUBTOTAL CLIFTON COURT FOREBAY AND VICINITY				\$ 103,000,000
	Interconnection between CCFB and DMC				
	2,800 lin. ft. of Earth Canal, Q=4,600 cfs:				
	Excavation	CY \$	2.00	375,000	\$ 750,000
	Compacted Embankment	CY \$	0.80	486,000	\$ 388,800
	Common Embankment	CY \$	0.50	203,000	\$ 101,500
	Borrow	CY \$	5.00	557,000	\$ 2,785,000
	Intake Structure with Radial Gates From Clifton Court Forebay	LS \$	9,135,000.00	1	\$ 9,135,000
	Extra Set of Radial Gates Below	LS \$	6,798,000.00	1	\$ 6,798,000
	Interconnection Channel	LS \$	51,500,000.00	1	\$ 51,500,000
	Fish Screens at Tracy PP	LS \$			
	SUBTOTAL CLIFTON COURT FOREBAY AND VICINITY				\$ 148,300

CONSTRUCTION TOTAL FOR CLIFTON COURT FOREBAY AND VICINITY

\$ 174,500,000

Footnote:

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

## Cost References:

1. Bockman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates*, October 1997.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 188,100,000  
Last Update November 3, 1997

## CVP-SWP IMPROVEMENTS

Description:

New fish screens at Skinner, fish screens at Tracy, new CCFB intake, and an intertie for Tracy and CCFB

**FACILITY GROUPING: DELTA CONVEYANCE  
CODE: KCCSIN**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	New fish Screen at Skinner	CFS \$	10,000.00	10,300	\$ 103,000,000 [REDACTED]
	SUBTOTAL SKINNER				\$ 103,000,000
	New intake at CCFB	LS \$	13,600,000.00	1	\$ 13,600,000 [REDACTED]
	SUBTOTAL CLIFTON COURT FOREBAY INTAKE				\$ 13,600,000
	Interconnection between CCFB and DMC 2,800 lin. ft. of Earth Canal, Q=4,600 cfs:				
	Excavation	CY \$	2.00	375,000	\$ 750,000
	Compacted Embankment	CY \$	0.80	486,000	\$ 388,800
	Common Embankment	CY \$	0.50	203,000	\$ 101,500
	Borrow	CY \$	5.00	557,000	\$ 2,785,000
	Intake Structure with Radial Gates From Clifton Court Forebay	LS \$	9,135,000.00	1	\$ 9,135,000
	Extra Set of Radial Gates Below				
	Interconnection Channel	LS \$	6,798,000.00	1	\$ 6,798,000
	Fish Screens at Tracy PP	LS \$	51,500,000.00	1	\$ 51,500,000 [REDACTED]
	SUBTOTAL CLIFTON COURT FOREBAY AND VICINITY				\$ 1458,300

Footnote: CONSTRUCTION TOTAL FOR CLIFTON COURT FOREBAY AND VICINITY

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

\$ 188,100,000

**Cost References:**

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 440,400,000.00  
Last Update November 3, 1997

## NORTH DELTA IMPROVEMENTS

Description: North Delta Improvements with a 10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin

**FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMHI**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. INTAKE STRUCTURE AT HOOD</b>					
Remove Existing Levee (Sacramento River)					
	Embankment	CY	\$ 4.44	52,800	\$ 234,523
	Riprap	TONS	\$ 8.33	1,870	\$ 15,574
	Bridge (Hwy. 160)	SF	\$ 100.00	42,000	\$ 4,200,000
	Intake Structure	LS	\$ 79,800,000.00	1	\$ 79,800,000
	Fish Screens	CFS	\$ 10,000.00	10,000	\$ 100,000,000
	Low Lift Pumping Plant (Q=10000 CFS)	LS	\$ 49,342,000.00	1	\$ 49,342,000
	Channel	LF	\$ 581.00	18,400	\$ 10,690,400
	Land Acquisition	AC	\$ 3,000.00	455	\$ 1,365,000
	Bridge (Lambert Rd.)	SF	\$ 100.00	42,000	\$ 4,200,000
	Discharge Structure Including Radial Gate				
	Structure	LS	\$ 7,580,000.00	1	\$ 7,580,000
	<b>SUBTOTAL INTAKE AND CHANNEL</b>				<b>\$ 274,427,490</b>
<b>II. GLANVILLE TRACT</b>					
	Land Acquisition	AC	\$ 3,000.00	730	\$ 2,190,000
Remove Existing Levee (Northern End)					
	Embankment	CY	\$ 4.44	124,800	\$ 554,326
	Riprap	TONS	\$ 8.33	4,420	\$ 36,811
Remove Existing Levee (Southern End)					
	Embankment	CY	\$ 4.44	211,200	\$ 938,091
	Riprap	TONS	\$ 8.33	7,500	\$ 62,462
New Levee					
	Embankment	CY	\$ 7.77	307,000	\$ 2,386,313
	Levee Foundation	CY	\$ 10.88	214,000	\$ 2,328,793
	Bedding	TONS	\$ 15.55	21,300	\$ 331,130
	Geotextile	SF	\$ 0.28	479,400	\$ 133,085
	Riprap	TONS	\$ 16.66	75,360	\$ 1,255,229
Reinforce Existing Levee					
	Embankment	CY	\$ 7.77	109,400	\$ 850,367
	Bedding	TONS	\$ 15.55	95,200	\$ 1,479,980
	Geotextile	SF	\$ 0.28	2,141,300	\$ 594,441
	Riprap	TONS	\$ 16.66	336,700	\$ 5,608,224
	Railroad Trestle	SF	\$ 100.00	31,200	\$ 3,120,000
	Bridge (Twin Cities Rd.)	SF	\$ 100.00	42,000	\$ 4,200,000
	Purchase Gas Wells	LS		1	
	<b>SUBTOTAL GLANVILLE TRACT</b>				<b>\$ 26,069,251</b>
<b>III. McCORMACK-WILLIAMSON TRACT</b>					
	Land Acquisition	AC	\$ 3,000.00	1,630	\$ 4,890,000
Remove Existing Levee (Northeastern Boundary)					
	Embankment	CY	\$ 4.44	96,000	\$ 426,405
	Riprap	TONS	\$ 8.33	3,400	\$ 28,316

Description: North Delta Improvements with a 10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMHI

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>Remove Existing Levee (Northern Boundary)</b>					
	Embankment	CY \$	4.44	48,000	\$ 213,202
	Riprap	TONS \$	8.33	1,700	\$ 14,158
<b>Remove Existing Levee (Southern Boundary)</b>					
	Embankment	CY \$	7.77	96,000	\$ 746,209
	Riprap	TONS \$	8.33	3,400	\$ 28,316
<b>SUBTOTAL McCORMACK-WILLIAMSON TRACT</b>					
<b>IV. NEW HOPE TRACT SETBACK LEVEE REACH 1 (18,000 FT)</b>					
	Land Acquisition	AC \$	2,000.00	210	\$ 420,000
	Utilities	LS \$	85,000.00	1	\$ 85,000
	Excavate Existing Channel	CY \$	4.44	333,600	\$ 1,481,757
	Reinforce Existing Levee	CY \$	3.33	115,703	\$ 385,440
	Excavate New Channel	CY \$	3.11	4,403,111	\$ 13,690,164
	Levee Embankment Using Channel Excavation	CY \$	1.11	641,866	\$ 712,747
	Riprap	TONS \$	16.66	272,232	\$ 4,534,416
	Bedding	TONS \$	15.55	107,653	\$ 1,673,575
	Geotextile (under bedding)	SF \$	0.28	3,329,718	\$ 924,354
	Aggregate Base	TONS \$	27.76	12,320	\$ 342,012
	Clearing and Grubbing	LS \$	700.00	150	\$ 105,000
<b>SUBTOTAL NEW HOPE TRACT SETBACK CHANNEL</b>					
<b>V. STATEN ISLAND SETBACK LEVEE REACH 8 (4,500 FT)</b>					
	Utilities	LS \$	190,000.00	1	\$ 190,000
	Reinforce Existing Levee	CY \$	3.33	35,592	\$ 118,567
	Excavate New Channel	CY \$	3.11	1,111,111	\$ 3,454,669
	Berm Embankment Using Channel Excavation	CY \$	3.33	18,518	\$ 61,689
	Levee Embankment Using Imported Borrow	CY \$	7.77	125,722	\$ 977,238
	Geotextile (under embankment)	SF \$	0.28	474,000	\$ 131,586
	Riprap	TONS \$	16.66	45,380	\$ 755,869
	Bedding	TONS \$	15.55	13,109	\$ 203,793
	Geotextile (under bedding)	SF \$	0.28	403,377	\$ 111,980
	Aggregate Base	TONS \$	27.76	2,240	\$ 62,184
	Clearing and Grubbing	LS \$	700.00	99	\$ 69,300
<b>SUBTOTAL STATEN ISLAND SETBACK CHANNEL</b>					
<b>VI. STATEN/TYLER ISLANDS SETBACK LEVEE REACH 9 (48,000 FT)</b>					
	Land Acquisition	AC \$	2,000.00	690	\$ 1,380,000
	Utilities	LS \$	113,000.00	1	\$ 113,000
	Bridges	LS \$	7,924,000.00	1	\$ 7,924,000
	Excavate Existing Channel	CY \$	4.44	2,266,557	\$ 10,067,407
	Reinforce Existing Levee	CY \$	3.33	50,000	\$ 166,564
	Excavate New Channel	CY \$	3.11	1,811,462	\$ 5,632,202
	Berm Embankment Using Channel Excavation	CY \$	3.33	812,456	\$ 2,706,525
	Levee Embankment Using Imported Borrow	CY \$	7.77	4,494,826	\$ 34,938,310
	Geotextile (under embankment)	SF \$	0.28	9,013,600	\$ 2,502,242
	Riprap	TONS \$	16.66	803,072	\$ 13,376,322
	Bedding	TONS \$	15.55	242,665	\$ 3,772,473
	Geotextile (under bedding)	SF \$	0.28	7,725,086	\$ 2,144,541

## APPENDIX C 3.2

4/29/98

## PRELIMINARY COST SUMMARY

DRAFT

Description: North Delta Improvements with a 10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMHI

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Aggregate Base	TONS	\$ 27.76	70,280	\$ 1,951,025
	Clearing and Grubbing	LS	\$ 700.00	483	\$ 338,100
	SUBTOTAL STATEN/TYLER ISLANDS SETBACK CHANNEL				\$ 2,289,125
VII.	BOULDIN ISLAND SETBACK LEVEE REACH 11 (21,000 FT)				
	Land Acquisition	AC	\$ 2,000.00	120	\$ 240,000
	Excavate Existing Channel	CY	\$ 4.44	3,949,563	\$ 17,542,844
	Reinforce Existing Levee	CY	\$ 3.33	395,000	\$ 1,315,859
	Excavate New Channel	CY	\$ 3.11	186,000	\$ 578,312
	Berm Embankment Using Channel Excavation	CY	\$ 3.33	950,000	\$ 3,164,724
	Levee Embankment Using Channel Excavation	CY	\$ 1.11	746,400	\$ 828,825
	Levee Embankment Using Imported Borrow	CY	\$ 7.77	746,400	\$ 5,801,772
	Geotextile (under embankment)	SF	\$ 0.28	2,091,000	\$ 580,477
	Riprap	TONS	\$ 16.66	106,200	\$ 1,768,914
	Bedding	TONS	\$ 15.55	42,470	\$ 660,239
	Geotextile (under bedding)	SF	\$ 0.28	1,415,700	\$ 393,009
	Aggregate Base	TONS	\$ 27.76	5,400	\$ 149,908
	Clearing and Grubbing	LS	\$ 700.00	48	\$ 33,600
	SUBTOTAL BOULDIN ISLAND SETBACK CHANNEL				\$ 3,058,482

## CONSTRUCTION TOTAL FOR NORTH DELTA IMPROVEMENTS:

## Footnote:

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each; CFS=cubic feet per second

## Cost References:

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.
2. California Department of Water Resources, Draft EIR/EIS, North Delta Program, November 1990.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 150,600,000  
Last Update November 3, 1997

## NORTH DELTA IMPROVEMENTS

Description: **North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin**

**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: ICIMSB**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. NEW HOPE TRACT SETBACK LEVEE REACH 1 (18,000 FT)</b>					
	Land Acquisition	AC	\$ 2,000.00	210	\$ 420,000
	Utilities	LS	\$ 85,000.00	1	\$ 85,000
	Excavate Existing Channel	CY	\$ 4.44	333,600	\$ 1,481,757
	Reinforce Existing Levee	CY	\$ 3.33	115,703	\$ 385,440
	Excavate New Channel	CY	\$ 3.11	4,403,111	\$ 13,690,164
	Levee Embankment Using Channel Excavation	CY	\$ 1.11	641,866	\$ 712,747
	Riprap	TON	\$ 16.66	272,232	\$ 4,534,416
	Bedding	TON	\$ 15.55	107,653	\$ 1,673,575
	Geotextile (under bedding)	SF	\$ 0.28	3,329,718	\$ 924,354
	Aggregate Base	TON	\$ 27.76	12,320	\$ 342,012
	Clearing and Grubbing	LS	\$ 700.00	150	\$ 105,000
	<b>SUBTOTAL NEW HOPE TRACT SETBACK CHANNEL</b>				
<b>II. STATEN ISLAND SETBACK LEVEE REACH 8 (4,500 FT)</b>					
	Utilities	LS	\$ 190,000.00	1	\$ 190,000
	Reinforce Existing Levee	CY	\$ 3.33	35,592	\$ 118,567
	Excavate New Channel	CY	\$ 3.11	1,111,111	\$ 3,454,669
	Berm Embankment Using Channel Excavation	CY	\$ 3.33	18,518	\$ 61,689
	Levee Embankment Using Imported Borrow	CY	\$ 7.77	125,722	\$ 977,238
	Geotextile (under embankment)	SF	\$ 0.28	474,000	\$ 131,586
	Riprap	TON	\$ 16.66	45,380	\$ 755,869
	Bedding	TON	\$ 15.55	13,109	\$ 203,793
	Geotextile (under bedding)	SF	\$ 0.28	403,377	\$ 111,980
	Aggregate Base	TON	\$ 27.76	2,240	\$ 62,184
	Clearing and Grubbing	LS	\$ 700.00	99	\$ 69,300
	<b>SUBTOTAL STATEN ISLAND SETBACK CHANNEL</b>				
<b>III. STATEN/TYLER ISLANDS SETBACK LEVEE REACH 9 (48,000 FT)</b>					
	Land Acquisition	AC	\$ 2,000.00	690	\$ 1,380,000
	Utilities	LS	\$ 113,000.00	1	\$ 113,000
	Bridges	LS	\$ 7,924,000.00	1	\$ 7,924,000
	Excavate Existing Channel	CY	\$ 4.44	2,266,557	\$ 10,067,407
	Reinforce Existing Levee	CY	\$ 3.33	50,000	\$ 166,564
	Excavate New Channel	CY	\$ 3.11	1,811,462	\$ 5,632,202
	Berm Embankment Using Channel Excavation	CY	\$ 3.33	812,456	\$ 2,706,525
	Levee Embankment Using Imported Borrow	CY	\$ 7.77	4,494,826	\$ 34,938,310
	Geotextile (under embankment)	SF	\$ 0.28	9,013,600	\$ 2,502,242
	Riprap	TON	\$ 16.66	803,072	\$ 13,376,322
	Bedding	TON	\$ 15.55	242,665	\$ 3,772,473
	Geotextile (under bedding)	SF	\$ 0.28	7,725,086	\$ 2,144,541
	Aggregate Base	TON	\$ 27.76	70,280	\$ 1,951,025
	Clearing and Grubbing	LS	\$ 700.00	483	\$ 338,100
	<b>SUBTOTAL STATEN/TYLER ISLANDS SETBACK CHANNEL</b>				

Description: **North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin**

**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: ICIMSB**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>IV. BOULDIN ISLAND SETBACK LEVEE REACH 11 (21,000 FT)</b>					
	Land Acquisition	AC \$	2,000.00	120 \$	240,000
	Excavate Existing Channel	CY \$	4.44	3,949,563 \$	17,542,844
	Reinforce Existing Levee	CY \$	3.33	395,000 \$	1,315,859
	Excavate New Channel	CY \$	3.11	186,000 \$	578,312
	Berm Embankment Using Channel Excavation	CY \$	3.33	950,000 \$	3,164,724
	Levee Embankment Using Channel Excavation	CY \$	1.11	746,400 \$	828,825
	Levee Embankment Using Imported Borrow	CY \$	7.77	746,400 \$	5,801,772
	Geotextile (under embankment)	SF \$	0.28	2,091,000 \$	580,477
	Riprap	TON: \$	16.66	106,200 \$	1,768,914
	Bedding	TON: \$	15.55	42,470 \$	660,239
	Geotextile (under bedding)	SF \$	0.28	1,415,700 \$	393,009
	Aggregate Base	TON: \$	27.76	5,400 \$	149,908
	Clearing and Grubbing	LS \$	700.00	48 \$	33,600
	<b>SUBTOTAL BOULDIN ISLAND SETBACK CHANNEL</b>				
	<b>CONSTRUCTION TOTAL FOR NORTH DELTA IMPROVEMENTS</b>				

**Footnote:**

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

**Cost References:**

1. Bookman-Edmonston Engineering, *CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates*, October 1997.
2. California Department of Water Resources, *Draft EIR/EIS*, North Delta Program, November 1990.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 569,600,000.00  
Last Update November 3, 1997

## NORTH DELTA IMPROVEMENTS

Description: North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

**FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMEF**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. INTAKE STRUCTURE AT HOOD</b>					
Remove Existing Levee (Sacramento River)					
	Embankment	CY \$	4.44	52,800	\$ 234,523
	Riprap	TON: \$	8.33	1,870	\$ 15,574
	Bridge (Hwy. 160)	SF \$	100.00	42,000	\$ 4,200,000
	Intake Structure	LS \$	79,800,000.00	1	\$ 79,800,000
	Fish Screens	CFS \$	10,000.00	10,000	\$ 100,000,000
	Low Lift Pumping Plant (Q=10000 CFS)	LS \$	49,342,000.00	1	\$ 49,342,000
	Channel	LF \$	581.00	18,400	\$ 10,690,400
	Land Acquisition	AC \$	3,000.00	455	\$ 1,365,000
	Bridge (Lambert Rd.)	SF \$	100.00	42,000	\$ 4,200,000
	Discharge Structure Including Radial Gate Struct	LS \$	7,580,000.00	1	\$ 7,580,000
<b>SUBTOTAL INTAKE AND CHANNEL</b>					
<b>II. GLANVILLE TRACT</b>					
	Land Acquisition	AC \$	3,000.00	730	\$ 2,190,000
Remove Existing Levee (Northern End)					
	Embankment	CY \$	4.44	124,800	\$ 554,326
	Riprap	TON: \$	8.33	4,420	\$ 36,811
Remove Existing Levee (Southern End)					
	Embankment	CY \$	4.44	211,200	\$ 938,091
	Riprap	TON: \$	8.33	7,500	\$ 62,462
New Levee					
	Embankment	CY \$	7.77	307,000	\$ 2,386,313
	Levee Foundation	CY \$	10.88	214,000	\$ 2,328,793
	Bedding	TON: \$	15.55	21,300	\$ 331,130
	Geotextile	SF \$	0.28	479,400	\$ 133,085
	Riprap	TON: \$	16.66	75,360	\$ 1,255,229
Reinforce Existing Levee					
	Embankment	CY \$	7.77	109,400	\$ 850,367
	Bedding	TON: \$	15.55	95,200	\$ 1,479,980
	Geotextile	SF \$	0.28	2,141,300	\$ 594,441
	Riprap	TON: \$	16.66	336,700	\$ 5,608,224
	Railroad Trestle	SF \$	100.00	31,200	\$ 3,120,000
	Bridge (Twin Cities Rd.)	SF \$	100.00	42,000	\$ 4,200,000
	Purchase Gas Wells	LS		1	
<b>SUBTOTAL GLANVILLE TRACT</b>					
<b>III. McCORMACK-WILLIAMSON TRACT</b>					
	Land Acquisition	AC \$	3,000.00	1,630	\$ 4,890,000
Remove Existing Levee (Northeastern Boundary)					
	Embankment	CY \$	4.44	96,000	\$ 426,405
	Riprap	TON: \$	8.33	3,400	\$ 28,316
Remove Existing Levee (Northern Boundary)					

Description: North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMEF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
	Remove Existing Levee (Southern Boundary)				
	Embankment	CY \$	7.77	96,000 \$	746,209
	Riprap	TON: \$	8.33	3,400 \$	28,316
	SUBTOTAL McCORMACK-WILLIAMSON TRACT				6,346,606
IV.	NEW HOPE TRACT				
	Land Acquisition	AC \$	3,000.00	3,800 \$	11,400,000
	New Levee				
	Embankment	CY \$	7.77	1,273,800 \$	9,901,255
	Foundation	CY \$	10.88	880,400 \$	9,580,696
	Bedding	TON: \$	15.55	67,500 \$	1,049,356
	Geotextile	SF \$	0.28	1,518,100 \$	421,436
	Riprap	TON: \$	16.66	238,700 \$	3,975,893
	Allowance for New Hope Landing Relocation	LS \$	10,000,000.00	1 \$	10,000,000
	Allowance for Wimpy's Marina Relocation	LS \$	1,200,000.00	1 \$	1,200,000
	Remove Existing Levee (Mokelumne River)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (Beaver Slough)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Bridge (Walnut Grove Road)	SF \$	100.00	84,000 \$	8,400,000
	Rebuild New Hope Tract Levee				
	Embankment	CY \$	7.77	85,700 \$	666,147
	Bedding	TON: \$	15.55	74,600 \$	1,159,733
	Geotextile	SF \$	0.28	1,677,900 \$	465,797
	Riprap	TON: \$	16.66	263,800 \$	4,393,969
	Relocated Irrigation Diversions and Drainage Pu	LS \$	3,800,000.00	1 \$	3,800,000
	Seepage Interception Wells (Beaver Slough)	LS \$	471,000.00	1 \$	471,000
	Reinforce Existing Levee (Beaver Slough)»				
	Embankment	CY \$	7.77	24,500 \$	190,439
	Bedding	TON: \$	15.55	21,300 \$	331,130
	Geotextile	SF \$	0.28	479,400 \$	133,085
	Riprap	TON: \$	16.66	75,400 \$	1,255,896
	Reinforce Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	7.77	67,800 \$	527,010
	Bedding	TON: \$	15.55	59,000 \$	917,215
	Geotextile	SF \$	0.28	1,326,400 \$	368,218
	Riprap	TON: \$	16.66	208,500 \$	3,472,868
	SUBTOTAL NEW HOPE TRACT				7,990,584
V.	CANAL RANCH TRACT WETLANDS				
	Land Acquisition	AC \$	3,000.00	5,850 \$	17,550,000
	Remove Existing Levee (Beaver Slough)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (Hog Slough)				
	Embankment	CY \$	4.44	96,000 \$	426,405

## APPENDIX C 5.2

Description: North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMEF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Riprap	TON:	\$ 8.33	3,400	\$ 28,316
	Reinforce Existing Levee (Beaver Slough)				
	Embankment	CY \$	7.77	74,300	\$ 577,534
	Bedding	TON: \$	15.55	64,700	\$ 1,005,827
	Geotextile	SF \$	0.28	1,454,200	\$ 403,697
	Riprap	TON: \$	16.66	228,600	\$ 3,807,663
	Reinforce Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	7.77	53,900	\$ 418,965
	Bedding	TON: \$	15.55	46,900	\$ 729,108
	Geotextile	SF \$	0.28	1,054,700	\$ 292,792
	Riprap	TON: \$	16.66	165,800	\$ 2,761,638
	Reinforce Existing Levee (Hog Slough)				
	Embankment	CY \$	7.77	57,200	\$ 444,616
	Bedding	TON: \$	15.55	49,700	\$ 772,637
	Geotextile	SF \$	0.28	1,118,600	\$ 310,532
	Riprap	TON: \$	16.66	175,900	\$ 2,929,868
	Relocate Utilities	LS		1	\$ 1
	SUBTOTAL CANAL RANCH TRACT WETLANDS				\$ 329,143,19
VI.	BRACK TRACT WETLANDS				
	Land Acquisition	AC \$	3,000.00	6,600	\$ 19,800,000
	Remove Existing Levee (Hog Slough)				
	Embankment	CY \$	4.44	96,000	\$ 426,405
	Riprap	TON: \$	8.33	3,400	\$ 28,316
	Remove Existing Levee (Sycamore Slough)				
	Embankment	CY \$	4.44	96,000	\$ 426,405
	Riprap	TON: \$	8.33	3,400	\$ 28,316
	Reinforce Existing Levee (Hog Slough)				
	Embankment	CY \$	7.77	57,200	\$ 444,616
	Bedding	TON: \$	15.55	49,700	\$ 772,637
	Geotextile	SF \$	0.28	1,118,600	\$ 310,532
	Riprap	TON: \$	16.66	175,900	\$ 2,929,868
	Reinforce Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	7.77	45,700	\$ 355,226
	Bedding	TON: \$	15.55	39,800	\$ 618,731
	Geotextile	SF \$	0.28	844,900	\$ 234,550
	Riprap	TON: \$	16.66	140,700	\$ 2,343,561
	Reinforce Existing Levee (Sycamore Slough)				
	Embankment	CY \$	7.77	93,900	\$ 729,885
	Bedding	TON: \$	15.55	81,700	\$ 1,270,109
	Geotextile	SF \$	0.28	1,837,700	\$ 510,159
	Riprap	TON: \$	16.66	288,900	\$ 4,812,046
	Relocate Utilities	LS		1	\$ 1
	SUBTOTAL BRACK TRACT WETLANDS				\$ 36,041,363
VII.	STATEN ISLAND SETBACK CHANNEL				
	Land Acquisition	AC \$	3,000.00	315	\$ 945,000
	Remove Existing Levee (Northern Boundary)				
	Embankment	CY \$	4.44	192,000	\$ 852,810
	Riprap	TON: \$	8.33	6,800	\$ 56,632
	Remove Existing Levee (Southern Boundary)				

Description: North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMEF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Embankment	CY \$	4.44	192,000 \$	852,810
	Riprap	TON: \$	8.33	6,800 \$	56,632
New Levee					
	Embankment	CY \$	7.77	653,900 \$	5,082,769
	Bedding	TON: \$	15.55	15,700 \$	244,072
	Geotextile	SF \$	0.28	351,600 \$	97,607
	Riprap	TON: \$	16.66	55,300 \$	921,101
	Foundation	CY \$	10.88	278,700 \$	3,032,872
Reinforce Existing Levee					
	Embankment	CY \$	7.77	18,800 \$	146,133
	Bedding	TON: \$	15.55	16,400 \$	254,955
	Geotextile	SF \$	0.28	367,600 \$	102,048
	Riprap	TON: \$	16.66	57,800 \$	962,742
Seepage Interception Wells	LS \$	2,078,000.00		1 \$	2,078,000
<b>SUBTOTAL STATEN ISLAND SETBACK CHANNEL</b>					<b>13,686,182</b>
VIII.	TERMINOUS TRACT SETBACK CHANNEL				
	Land Acquisition	AC \$	3,000.00	220 \$	660,000
	Remove Existing Levee (Northern Boundary)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (Southern Boundary)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
New Levee					
	Embankment	CY \$	7.77	772,800 \$	6,006,979
	Bedding	TON: \$	15.55	18,600 \$	289,156
	Geotextile	SF \$	0.28	415,600 \$	115,374
	Riprap	TON: \$	16.66	65,400 \$	1,089,331
	Foundation	CY \$	10.88	329,400 \$	3,584,600
Reinforce Existing Levee					
	Embankment	CY \$	7.77	22,900 \$	178,002
	Bedding	TON: \$	15.55	19,900 \$	309,366
	Geotextile	SF \$	0.28	447,500 \$	124,229
	Riprap	TON: \$	16.66	70,400 \$	1,172,613
Seepage Interception Wells	LS \$	1,806,000.00		1 \$	1,806,000
Relocated Irrigation Diversion and Drainage Pump	LS \$	315,000.00		1 \$	315,000
<b>SUBTOTAL TERMINOUS TRACT SETBACK CHANNEL</b>					<b>16,360,091</b>
VIV.	BOULDIN ISLAND				
	Land Acquisition	AC \$	3,000.00	5,913 \$	17,739,000
	Remove Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	4.44	192,000 \$	852,810
	Riprap	TON: \$	8.33	6,800 \$	56,632
	Remove Existing Levee (San Joaquin River)				
	Embankment	CY \$	4.44	192,000 \$	852,810
	Riprap	TON: \$	8.33	6,800 \$	56,632
Reinforce Existing Levee					
	Embankment	CY \$	7.77	350,900 \$	2,727,548
	Bedding	TON: \$	15.55	305,300 \$	4,746,198
	Geotextile	SF \$	0.28	6,871,400 \$	1,907,551

Description: North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMEF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Riprap	TON:	\$ 16.66	1,080,200	\$ 17,992,288
	Elevated Roadway				
	Embankment	CY	\$ 7.77	2,493,400	\$ 19,381,213
	Bedding	TON:	\$ 15.55	156,200	\$ 2,428,287
	Geotextile	SF	\$ 0.28	3,515,600	\$ 975,956
	Riprap	TON:	\$ 16.66	552,700	\$ 9,206,015
	Foundation	CY	\$ 10.88	1,188,000	\$ 12,928,064
	Aggregate Base	TON:	\$ 19.15	14,600	\$ 279,590
	Asphalt Concrete	TON:	\$ 58.92	6,600	\$ 388,872
	Bridge	SF	\$ 100.00	84,000	\$ 8,400,000
	Seepage Interceptor Wells	LS	\$ 2,650,000.00	1	\$ 2,650,000
	SUBTOTAL BOULDIN ISLAND				\$ 103,569,467

CONSTRUCTION TOTAL FOR NORTH DELTA IMPROVEMENTS:

\$ 103,569,467

Cost References:

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.
2. California Department of Water Resources, Draft EIR/EIS, North Delta Program, November 1990.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 272,500,000.00  
Last Update November 3, 1997

## NORTH DELTA IMPROVEMENTS

Description: North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: ICIMWF**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	McCORMACK AND WILLIAMSON TRACT				
	Land Acquisition	AC \$	3,000.00	1,630 \$	4,890,000
	Remove Existing Levee (Northeastern Boundary)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (Dead Horse Cut)				
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
	SUBTOTAL McCORMACK AND WILLIAMSON TRACT				572,081
II.	DEAD HORSE ISLAND				
	Land Acquisition	AC \$	3,000.00	225 \$	675,000
	Remove Existing Levee (Dead Horse Cut)				
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
	Remove Existing Levee (Snodgrass Slough)				
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
	Reinforce Existing Levee along Snodgrass Slough				
	Embankment	CY \$	7.77	31,100 \$	241,740
	Bedding	TON: \$	15.55	27,000 \$	419,742
	Geotextile	SF \$	0.28	607,300 \$	168,591
	Riprap	TON: \$	16.66	95,500 \$	1,590,690
	Reinforce Existing Levee along N. Mokelumne River				
	Embankment	CY \$	7.77	16,300 \$	126,700
	Bedding	TON: \$	15.55	14,200 \$	220,753
	Geotextile	SF \$	0.28	319,600 \$	88,723
	Riprap	TON: \$	16.66	50,240 \$	836,820
	SUBTOTAL DEAD HORSE ISLAND				1,823,481
III.	ANDRUS ISLAND				
	Land Acquisition	AC \$	3,000.00	125 \$	375,000
	Remove Existing Levee (Sacramento River)				
	Embankment	CY \$	4.44	24,000 \$	106,601
	Riprap	TON: \$	8.33	850 \$	7,079
	Remove Existing Levee (Georgiana Slough)				
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
	Reinforce Existing Levee (Georgiana Slough)				
	Embankment	CY \$	7.77	9,000 \$	69,957
	Bedding	TON: \$	15.55	7,900 \$	122,813
	Geotextile	SF \$	0.28	175,800 \$	48,803
	Riprap	TON: \$	16.66	27,700 \$	461,383
	Elevated Roadway				

Description: North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMWF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Embankment	CY \$	7.77	302,000 \$	2,347,448
	Bedding	TON: \$	15.55	12,800 \$	198,989
	Geotextile	SF \$	0.28	287,700 \$	79,868
	Riprap	TON: \$	16.66	45,300 \$	754,537
	Foundation	CY \$	10.88	169,200 \$	1,841,270
	Aggregate Base	TON: \$	19.15	2,380 \$	45,577
	Asphalt Concrete	TON: \$	58.92	1,080 \$	63,634
<b>New Levee</b>					
	Embankment	CY \$	7.77	44,600 \$	346,676
	Bedding	TON: \$	15.55	2,500 \$	38,865
	Geotextile	SF \$	0.28	56,000 \$	15,546
	Riprap	TON: \$	16.66	8,800 \$	146,577
	Foundation	CY \$	10.88	27,800 \$	302,525
	Bridge (Walnut Grove Road)	SF \$	100.00	29,400 \$	2,940,000
	Silt Control Gradient	LS \$	2,108,102.00	1 \$	2,108,102
<b>SUBTOTAL ANDRUS ISLAND</b>					
<b>IV. TYLER ISLAND</b>					
	Land Acquisition	AC \$	3,000.00	8,818 \$	26,454,000
	Remove Existing Levee (Snodgrass Slough)				
	Embankment	CY \$	4.44	48,000 \$	213,202
	Riprap	TON: \$	8.33	1,700 \$	14,158
<b>New Levee</b>					
	Embankment	CY \$	7.77	280,400 \$	2,179,551
	Bedding	TON: \$	15.55	15,700 \$	244,072
	Geotextile	SF \$	0.28	351,600 \$	97,607
	Riprap	TON: \$	16.66	55,300 \$	921,101
	Foundation	CY \$	10.88	174,600 \$	1,900,034
<b>Elevated Road</b>					
	Embankment	CY \$	7.77	42,000 \$	326,466
	Bedding	TON: \$	15.55	1,800 \$	27,983
	Geotextile	SF \$	0.28	40,000 \$	11,104
	Riprap	TON: \$	16.66	6,300 \$	104,936
	Foundation	CY \$	10.88	23,500 \$	255,732
	Aggregate Base	TON: \$	19.15	330 \$	6,320
	Asphalt Concrete	TON: \$	58.92	150 \$	8,838
	Bridge (Thorton-Walnut Grove Road)	SF \$	100.00	42,000 \$	4,200,000
	Weir w/ Bridge (Tyler Island Road)	LS \$	2,520,000.00	1 \$	2,520,000
<b>Reinforce Existing Levee (Georgiana Slough)</b>					
	Embankment	CY \$	7.77	256,300 \$	1,992,221
	Bedding	TON: \$	15.55	223,000 \$	3,466,761
	Geotextile	SF \$	0.28	5,017,800 \$	1,392,978
	Riprap	TON: \$	16.66	788,800 \$	13,138,601
<b>Reinforce Existing Levee Along N. Mokelumne River</b>					
	Embankment	CY \$	7.77	202,400 \$	1,573,256
	Bedding	TON: \$	15.55	176,100 \$	2,737,653
	Geotextile	SF \$	0.28	3,963,100 \$	1,100,186
	Riprap	TON: \$	16.66	623,000 \$	10,376,963
<b>Remove Existing Levee (Mokelumne River)</b>					
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316

Description: North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMWF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
SUBTOTAL TYLER ISLAND					25,718,444
V.	BOULDIN ISLAND				
	Land Acquisition	AC \$	3,000.00	5,913 \$	17,739,000
	Remove Existing Levee (Mokelumne River)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (San Joaquin River)				
	Embankment	CY \$	4.44	144,000 \$	639,607
	Riprap	TON: \$	8.33	5,100 \$	42,474
	Reinforce Existing Levee				
	Embankment	CY \$	7.77	363,200 \$	2,823,156
	Bedding	TON: \$	15.55	316,000 \$	4,912,540
	Geotextile	SF \$	0.28	7,111,100 \$	1,974,094
	Riprap	TON: \$	16.66	1,117,900 \$	18,620,236
	Elevated Roadway				
	Embankment	CY \$	7.77	2,493,400 \$	19,381,213
	Bedding	TON: \$	15.55	156,200 \$	2,428,287
	Geotextile	SF \$	0.28	3,515,600 \$	975,956
	Riprap	TON: \$	16.66	552,700 \$	9,206,015
	Foundation	CY \$	10.88	1,188,000 \$	12,928,064
	Aggregate Base	TON: \$	19.15	14,600 \$	279,590
	Asphalt Concrete	TON: \$	58.92	6,600 \$	388,872
	Bridge	SF \$	100.00	84,000 \$	8,400,000
	Seepage Interception Wells	LS \$	3,560,000.00	1 \$	3,560,000
SUBTOTAL BOULDIN ISLAND					10,733,826
VI.	CANAL RANCH TRACT WETLANDS				
	Land Acquisition	AC \$	3,000.00	5,850 \$	17,550,000
	Remove Existing Levee (Beaver Slough)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Remove Existing Levee (Hog Slough)				
	Embankment	CY \$	4.44	96,000 \$	426,405
	Riprap	TON: \$	8.33	3,400 \$	28,316
	Reinforce Existing Levee (Beaver Slough)				
	Embankment	CY \$	7.77	74,300 \$	577,534
	Bedding	TON: \$	15.55	64,700 \$	1,005,827
	Geotextile	SF \$	0.28	1,454,200 \$	403,697
	Riprap	TON: \$	16.66	228,600 \$	3,807,663
	Reinforce Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	7.77	53,900 \$	418,965
	Bedding	TON: \$	15.55	46,900 \$	729,108
	Geotextile	SF \$	0.28	1,054,700 \$	292,792
	Riprap	TON: \$	16.66	165,800 \$	2,761,638
	Reinforce Existing Levee (Hog Slough)				
	Embankment	CY \$	7.77	57,200 \$	444,616
	Bedding	TON: \$	15.55	49,700 \$	772,637
	Geotextile	SF \$	0.28	1,118,600 \$	310,532
	Riprap	TON: \$	16.66	175,900 \$	2,929,868
	Relocate Utilities	LS		1 \$	

Description: North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: ICIMWF

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
SUBTOTAL CANAL RANCH TRACT WETLANDS					32,914,319
VII.	BRACK TRACT WETLANDS				
	Land Acquisition	AC \$	3,000.00	6,600	\$ 19,800,000
	Remove Existing Levee (Hog Slough)				
	Embankment	CY \$	4.44	96,000	\$ 426,405
	Riprap	TON: \$	8.33	3,400	\$ 28,316
	Remove Existing Levee (Sycamore Slough)				
	Embankment	CY \$	4.44	96,000	\$ 426,405
	Riprap	TON: \$	8.33	3,400	\$ 28,316
	Reinforce Existing Levee (Hog Slough)				
	Embankment	CY \$	7.77	57,200	\$ 444,616
	Bedding	TON: \$	15.55	49,700	\$ 772,637
	Geotextile	SF \$	0.28	1,118,600	\$ 310,532
	Riprap	TON: \$	16.66	175,900	\$ 2,929,868
	Reinforce Existing Levee (S. Mokelumne River)				
	Embankment	CY \$	7.77	45,700	\$ 355,226
	Bedding	TON: \$	15.55	39,800	\$ 618,731
	Geotextile	SF \$	0.28	844,900	\$ 234,550
	Riprap	TON: \$	16.66	140,700	\$ 2,343,561
	Reinforce Existing Levee (Sycamore Slough)				
	Embankment	CY \$	7.77	93,900	\$ 729,885
	Bedding	TON: \$	15.55	81,700	\$ 1,270,109
	Geotextile	SF \$	0.28	1,837,700	\$ 510,159
	Riprap	TON: \$	16.66	288,900	\$ 4,812,046
	Relocate Utilities	LS		1	
SUBTOTAL BRACK TRACT WETLANDS					6,041,363

CONSTRUCTION TOTAL FOR NORTH DELTA IMPROVEMENTS:

272,500,000.00

Cost References:

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.
2. California Department of Water Resources, Draft EIR/EIS, North Delta Program, November 1990.

4/29/98

## PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 41,500,000  
Last Update November 3, 1997

**SOUTH DELTA IMPROVEMENTS**

Description: **South Delta Improvements, typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers**

FACILITY GROUPING: **DELTA CONVEYANCE**  
CODE: **JCIMTY**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Dredging Along a Reach of Old River	CY	\$ 12,700,000.00	1	\$ 12,700,000
	Flow Control Barriers on Middle River	LS	\$ 2,800,000.00	1	\$ 2,800,000
	Flow Control Barriers on Old River near Tracy	LS	\$ 5,700,000.00	1	\$ 5,700,000
	Flow Control Barriers Grant Line Canal	LS	\$ 11,400,000.00	1	\$ 11,400,000
	Operable Fish Barrier at head of Old River	LS	\$ 8,900,000.00	1	\$ 8,900,000
	<b>SUBTOTAL SOUTH DELTA IMPROVEMENTS</b>				<b>\$ 41,500,000</b>
	<b>CONSTRUCTION TOTAL FOR SOUTH DELTA IMPROVEMENTS</b>				<b>\$ 41,500,000</b>

## Footnote:

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

## Cost References:

1. California Department of Water Resources, Interim South Delta Program

4/29/98

## PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 28,800,000  
Last Update November 3, 1997

**SOUTH DELTA IMPROVEMENTS**

Description: **South Delta Improvements with NO Dredging including Operable Fish Barrier, and three Flow Barriers**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: JCIMND

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Flow Control Barriers on Middle River	LS	\$ 2,800,000.00	1	\$ 2,800,000
	Flow Control Barriers on Old River near Tracy	LS	\$ 5,700,000.00	1	\$ 5,700,000
	Flow Control Barriers Grant Line Canal	LS	\$ 11,400,000.00	1	\$ 11,400,000
	Operable Fish Barrier at head of Old River	LS	\$ 8,900,000.00	1	\$ 8,900,000
	<b>SUBTOTAL SOUTH DELTA IMPROVEMENTS</b>				
	<b>CONSTRUCTION TOTAL FOR SOUTH DELTA IMPROVEMENTS</b>				

## Footnote:

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

## Cost References:

1. California Department of Water Resources, Interim South Delta Program

APPENDIX C 8.1

D - 0 1 0 5 1 5

D-010515

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 142,100,000  
Last Update November 3, 1997

## SOUTH DELTA IMPROVEMENTS

Description: South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: JCIMSB

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Operable Fish Barrier at head of Old River	LS	\$ 8,900,000.00	1	\$ 8,900,000
	SUBTOTAL FISH BARRIER				
	South Delta Habitat Palm Tract Setback Levees				
	Land Acquisition	AC	\$ 3,000.00	1,047	\$ 3,141,000
	Remove Existing Levee (Northern Boundary)				
	Embankment	CY	\$ 4.44	144,000	\$ 639,607
	Riprap	TONS	\$ 8.33	5,100	\$ 42,474
	Remove Existing Levee (Southern Boundary)				
	Embankment	CY	\$ 4.44	144,000	\$ 639,607
	Riprap	TONS	\$ 8.33	5,100	\$ 42,474
	New Levee (Western Boundary)				
	Embankment	CY	\$ 7.77	1,461,500	\$ 11,360,248
	Bedding	TONS	\$ 15.55	42,600	\$ 662,260
	Geotextile	SF	\$ 0.28	958,800	\$ 266,170
	Riprap	TONS	\$ 16.66	150,700	\$ 2,510,126
	Foundation	CY	\$ 10.88	688,000	\$ 7,486,960
	Reinforce Existing Levee				
	Embankment	CY	\$ 7.77	82,400	\$ 640,496
	Bedding	TONS	\$ 15.55	71,700	\$ 1,114,649
	Geotextile	SF	\$ 0.28	1,614,000	\$ 448,058
	Riprap	TONS	\$ 16.66	253,700	\$ 4,225,739
	Relocated Irrigation Diversions and Drainage Pu	LS	\$ 1,047,000.00	1	\$ 1,047,000
	Railroad Trestle	SF	\$ 100.00	60,000	\$ 6,000,000
	SUBTOTAL PALM TRACT				
	South Delta Habitat Orwood Tract Setback Levees				
	Land Acquisition	AC	\$ 3,000.00	690	\$ 2,070,000
	New Levee (Western Boundary)				
	Embankment	CY	\$ 7.77	999,500	\$ 7,769,120
	Bedding	TONS	\$ 15.55	27,000	\$ 419,742
	Geotextile	SF	\$ 0.28	607,200	\$ 168,563
	Riprap	TONS	\$ 16.66	95,500	\$ 1,590,690
	Foundation	CY	\$ 10.88	451,000	\$ 4,907,876
	Reinforce Existing Levee				
	Embankment	CY	\$ 7.77	43,300	\$ 336,571
	Bedding	TONS	\$ 15.55	37,600	\$ 584,530
	Geotextile	SF	\$ 0.28	846,900	\$ 235,106
	Riprap	TONS	\$ 16.66	133,100	\$ 2,216,972
	Remove Existing Levee (Southern Boundary)				
	Embankment	CY	\$ 4.44	124,800	\$ 554,326
	Riprap	TONS	\$ 8.33	4,420	\$ 36,811
	Remove Existing Levee (N.E. Corner)				
	Embankment	CY	\$ 4.44	144,000	\$ 639,607

Description: South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: JCIMSB

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Riprap	TONS \$	8.33	5,100	\$ 42,474
	Relocated Irrigation Diversions and Drainage Pu	LS \$	690,000.00	1	\$ 690,000
	Raise Mokelumne Aqueduct	LS \$	4,078,000.00	1	\$ 4,078,000
	SUBTOTAL ORWOOD TRACT				\$ 26,340,389
	South Delta Habitat Byron Tract Setback Levees				
	Land Acquisition	AC \$	3,000.00	1,102	\$ 3,306,000
	Remove Existing Levee (Northern Boundary)				
	Embankment	CY \$	4.44	192,000	\$ 852,810
	Riprap	TONS \$	8.33	6,800	\$ 56,632
	Remove Existing Levee (North of Hwy. 4)				
	Embankment	CY \$	4.44	48,000	\$ 213,202
	Riprap	TONS \$	8.33	1,700	\$ 14,158
	New Levee				
	Embankment	CY \$	7.77	965,100	\$ 7,501,728
	Bedding	TONS \$	15.55	36,200	\$ 562,766
	Geotextile	SF \$	0.28	815,000	\$ 226,250
	Riprap	TONS \$	16.66	128,100	\$ 2,133,690
	Foundation	CY \$	10.88	523,600	\$ 5,697,924
	Reinforce Existing Levee				
	Embankment	CY \$	7.77	46,500	\$ 361,445
	Bedding	TONS \$	15.55	40,500	\$ 629,613
	Geotextile	SF \$	0.28	910,900	\$ 252,873
	Riprap	TONS \$	16.66	143,200	\$ 2,385,202
	Elevated Roadway				
	Embankment	CY \$	7.77	334,400	\$ 2,599,293
	Bedding	TONS \$	15.55	11,400	\$ 177,225
	Geotextile	SF \$	0.28	255,700	\$ 70,984
	Riprap	TONS \$	16.66	40,200	\$ 669,589
	Foundation	CY \$	10.88	166,400	\$ 1,810,800
	Aggregate Base	TONS \$	19.15	2,112	\$ 40,445
	Asphalt Concrete	TONS \$	58.92	960	\$ 56,563
	Bridge	SF \$	100.00	84,000	\$ 8,400,000
	Relocated Irrigation Diversions and Drainage Pu	LS \$	1,102,000.00	1	\$ 1,102,000
	SUBTOTAL BYRON TRACT				\$ 19,121,192
	South Delta Habitat Victoria Island Setback Levees				
	Land Acquisition	AC \$	3,000.00	546	\$ 1,638,000
	Remove Existing Levee (Northern Boundary)				
	Embankment	CY \$	4.44	48,000	\$ 213,202
	Riprap	TONS \$	8.33	1,700	\$ 14,158
	Remove Existing Levee (Old River and CCFB)				
	Embankment	CY \$	4.44	48,000	\$ 213,202
	Riprap	TONS \$	8.33	1,700	\$ 14,158
	New Levee				
	Embankment	CY \$	7.77	1,281,300	\$ 9,959,553
	Bedding	TONS \$	15.55	44,000	\$ 684,025
	Geotextile	SF \$	0.28	990,800	\$ 275,053
	Riprap	TONS \$	16.66	155,800	\$ 2,595,074
	Foundation	CY \$	10.88	661,400	\$ 7,197,493
	Reinforce Existing Levee				

Description: South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: JCIMSB

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Embankment	CY \$	7.77	53,100 \$	412,747
	Bedding	TONS \$	15.55	46,200 \$	718,226
	Geotextile	SF \$	0.28	1,038,700 \$	288,351
	Riprap	TONS \$	16.66	163,300 \$	2,719,997
	Relocated Irrigation Diversions and Drainage Pu LS	\$	546,000.00	1 \$	546,000
	SUBTOTAL VICTORIA ISLAND				27,489,238
	CONSTRUCTION TOTAL FOR SOUTH DELTA IMPROVEMENTS:				142,100,000

## Footnote:

aLS= lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

## Cost References:

1. U.S. Bureau of Reclamation, Land Resources Branch, Graham McMullen, February 1997.
2. Cost developed by Bookman-Edmonston Engineering.
3. California Department of Water Resources, Los Banos Grandes Facilities Report, Appendix A: Designs and Cost Estimates, December 1990.
4. U.S. Bureau of Reclamation, Appraisal Design Criteria and Cost Estimate Appendix, West Sacramento Canal Unit, Sacramento River Division, CVP, September 1980.
5. California Department of Water Resources, Interim South Delta Program

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 8,900,000  
Last Update November 3, 1997

**SOUTH DELTA IMPROVEMENTS**

Description: **South Delta Improvements with one Operable Fish Barrier ONLY**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: JCIMFB

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Operable Fish Barrier at head of Old River	LS	\$ 8,900,000.00	1	\$ 8,900,000
	SUBTOTAL SOUTH DELTA IMPROVEMENTS				\$ 8,900,000
	CONSTRUCTION TOTAL FOR SOUTH DELTA IMPROVEMENTS				\$ 8,900,000

Footnote:

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

Cost References:

1. California Department of Water Resources, Interim South Delta Program

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 1,961,000,000  
Last Update November 3, 1997

## MULTIPLE INTAKES

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMHID

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>NORTHERN 15,000 CFS DIVERSION AT HOOD</b>					
<b>I. INTAKE FACILITIES</b>					
	Intake Facility From Sacramento River	LS \$	45,906,000.00	1	45,906,000
	Fish Screening Facility	CFS \$	10,000.00	15,000	150,000,000
	Miscellaneous Cost @ 20%				\$ 39,181,200
	<b>SUBTOTAL INTAKE FACILITIES</b>				<b>35,087,200</b>
<b>II. BRIDGES</b>					
	State Hwy. 24	SF \$	100.00	22,680	2,268,000
	State Hwy. 12	SF \$	100.00	22,680	2,268,000
	State Hwy. 4	SF \$	100.00	22,680	2,268,000
	Tracy Road	SF \$	100.00	22,680	2,268,000
	Lambert Road	SF \$	100.00	16,200	1,620,000
	Laurel Lane	SF \$	100.00	16,200	1,620,000
	Walnut Grove Road	SF \$	100.00	16,200	1,620,000
	Peltier Road	SF \$	100.00	16,200	1,620,000
	Woodbridge Road	SF \$	100.00	16,200	1,620,000
	Atherton Road	SF \$	100.00	16,200	1,620,000
	McDonald Road	SF \$	100.00	16,200	1,620,000
	Calpack Road	SF \$	100.00	16,200	1,620,000
	Bonatti Road	SF \$	100.00	16,200	1,620,000
	Middle River O & M Road	SF \$	100.00	16,200	1,620,000
	Southern Pacific R. R.	LS \$	3,039,437.00	1	3,039,437
	Western Pacific R. R.	LS \$	3,011,581.00	1	3,011,581
	A. T. & S. F. R. R. - Main Line	LS \$	3,531,907.00	1	3,531,907
	<b>SUBTOTAL BRIDGES</b>				<b>35,087,200</b>
<b>III. CULVERTS (2)</b>					
	Concrete Including Rebar and Earthworks	CY \$	600.00	285	171,000
	108" Dia. RCP	LF \$	324.00	3,420	1,108,080
	Intake Structures	LS \$	484,693.00	1	484,693
	Riprap	CY \$	50.00	3,400	170,000
	<b>SUBTOTAL CULVERTS</b>				<b>1,974,773</b>
<b>IV. PUMPING PLANT</b>					
	5,000 cfs, TDH - 10 feet, HP - 8,360)	LS \$	57,807,000.00	1	57,807,000
	<b>SUBTOTAL PUMPING PLANT</b>				<b>57,807,000</b>
<b>V. EARTH CANAL</b>					
	Excavation	CY \$	2.00	69,373,000	138,746,000
	Compacted Embankment	CY \$	0.80	31,002,000	24,801,600
	Common Embankment	CY \$	0.50	6,403,000	3,201,500
	Rights of Way	AC \$	5,000.00	5,330	26,650,000
	Relocation of Existing Property	LS \$	57,591,800.00	1	57,591,800

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMHD

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Fencing	LF	\$ 5.00	464,000	2,320,000
	SUBTOTAL EARTH CANAL				253,310,900
VI.	MOKELUMNE RIVER SIPHON				
	6-30'X30' Concrete Box Including Rebar & E:	CY	\$ 600.00	33,600	20,160,000
	Transitions Concrete	CY	\$ 600.00	7,000	4,200,000
	Riprap	CY	\$ 50.00	27,180	1,359,000
	Sand and Gravel Bedding	CY	\$ 50.00	9,060	453,000
	Channel Excavation	CY	\$ 2.00	477,500	955,000
	Compacted Embankment	CY	\$ 0.80	289,000	231,200
	Temporary Dikes	CY	\$ 4.00	46,500	186,000
	Fill in Old River Bed	CY	\$ 2.00	189,000	378,000
	Level Abandoned Levee	CY	\$ 2.00	210,000	420,000
	Dewatering and Maintenance of Site	LS	\$ 1,274,875.00	1	1,274,875
	SUBTOTAL MOKELUMNE RIVER SIPHON				29,517,075
VII.	SAN JOAQUIN RIVER SIPHON				
	Dewatering and Pumping	LS	\$ 1,015,628.00	1	1,015,628
	Strip and Waste Peat	CY	\$ 2.00	66,400	132,800
	6-30'X30' Concrete Box Including Rebar & E:	CY	\$ 600.00	32,590	19,554,000
	Transitions Concrete	CY	\$ 600.00	7,000	4,200,000
	Trench Excavation	CY	\$ 2.00	663,000	1,326,000
	Spoil Unsuitable Material	CY	\$ 2.00	82,000	164,000
	Compacted Embankment	CY	\$ 0.80	37,000	29,600
	Riprap	CY	\$ 50.00	19,800	990,000
	Gravel Bedding	CY	\$ 50.00	4,800	240,000
	Sand Backfill	CY	\$ 4.00	554,800	2,219,200
	Open Joint Tile - 6" Dia.	LF	\$ 2.00	13,900	27,800
	Gravel Filter	CY	\$ 50.00	980	49,000
	Sheet Piling	SF	\$ 25.00	32,000	800,000
	Timber Piling	EA	\$ 1,356.00	380	515,280
	Placing Fabricated Barrel Units	LS	\$ 3,760,000.00	1	3,760,000
	Casting Basin	LS	\$ 4,840,000.00	1	4,840,000
	Slide Gates and Hoists	LS	\$ 223,000.00	1	223,000
	SUBTOTAL SAN JOAQUIN RIVER SIPHON				49,086,208
VIII.	OLD RIVER SIPHON				
	6-30'X30' Concrete Box Including Rebar & E:	CY	\$ 600.00	25,200	15,120,000
	Transitions Concrete	CY	\$ 600.00	7,000	4,200,000
	Compacted Embankment	CY	\$ 0.80	136,000	108,800
	Sand and Gravel Bedding	CY	\$ 50.00	6,040	302,000
	Riprap	CY	\$ 50.00	24,000	1,200,000
	Replace Levee Road	LF	\$ 23.00	1,700	39,100
	Cofferdams (2)	CY	\$ 2.80	72,000	201,600
	Remove Old Levees and Two Cofferdams	CY	\$ 1.50	204,000	306,000
	Bypass Channel	LF	\$ 1,183,256.00	1	1,183,256
	Dewatering	LF	\$ 1,158,605.00	1	1,158,605
	SUBTOTAL OLD RIVER SIPHON				3,339,361
IX.	MIDDLE RIVER SIPHON				
	Temporary River Realignment	LS	\$ 7,527,254.00	1	7,527,254
	Dewatering	LS	\$ 119,101.00	1	119,101

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMIH

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Siphon - Concrete Including Rebar Earthworks CY	TON \$	600.00	23,560	14,136,000
	Riprap	TON \$	27.00	64,710	1,747,170
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	5,574,333
	<b>SUBTOTAL MIDDLE RIVER SIPHON</b>				<b>35,455,997</b>
X.	<b>14-MILE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	2,596,476.00	1	2,596,476
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar Earthworks CY	TON \$	600.00	9,820	5,892,000
	Riprap	TON \$	27.00	3,690	99,630
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	2,609,869
	<b>SUBTOTAL 14-MILE SLOUGH SIPHON</b>				<b>13,659,215</b>
XI.	<b>WHITE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	960,254.00	1	960,254
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw CY	TON \$	600.00	3,930	2,358,000
	Riprap	TON \$	27.00	23,600	637,200
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	1,683,339
	<b>SUBTOTAL WHITE SLOUGH SIPHON</b>				<b>10,160,033</b>
XII.	<b>SYCAMORE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	528,561.00	1	528,561
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw CY	TON \$	600.00	1,960	1,176,000
	Riprap	TON \$	27.00	20,080	542,160
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	1,341,592
	<b>SUBTOTAL SYCAMORE SLOUGH SIPHON</b>				<b>8,049,553</b>
XIII.	<b>HOG SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	781,259.00	1	781,259
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw CY	TON \$	600.00	2,950	1,770,000
	Riprap	TON \$	27.00	22,430	605,610
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	1,523,622
	<b>SUBTOTAL HOG SLOUGH SIPHON</b>				<b>9,141,731</b>
XIV.	<b>BEAVER SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	2,667,021.00	1	2,667,021
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw CY	TON \$	600.00	9,820	5,892,000
	Riprap	TON \$	27.00	37,700	1,017,900

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs)**  
**the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMIH

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	2,807,632
	<b>SUBTOTAL BEAVER SLOUGH SIPHON</b>				<b>16,845,793</b>
XV.	<b>LOST SLOUGH SIPHON</b>				
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	4,910	2,946,000
	Riprap	TON \$	27.00	27,100	731,700
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	1,627,788
	<b>SUBTOTAL LOST SLOUGH SIPHON</b>				<b>9,766,723</b>
XVI.	<b>SNODGRASS SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	1,000,265.00	1	1,000,265
	Dewatering	LS \$	119,101.00	1	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	3,930	2,358,000
	Riprap	TON \$	27.00	25,200	680,400
	Access Road	MILE \$	526,442.00	0	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000	4,200,000
	Miscellaneous @ 20%			\$	1,699,981
	<b>SUBTOTAL SNODGRASS SLOUGH SIPHON</b>				<b>10,199,386</b>
<b>2ND 15,000 CFS INTAKE AT SAN JOAQUIN RIVER FOR THE NORTHERN INTAKE AT THE NORTHERN END OF LOWER ROBERTS</b>					
XVII.	<b>INTAKE FACILITIES</b>				
	20'X50' Radial Gates	EA \$	510,000.00	5	2,550,000
	Concrete	CY \$	600.00	8,000	4,800,000
	Dewatering	LS \$	150,000.00	1	150,000
	Electrical Works	LS \$	500,000.00	1	500,000
	Fish Screens	CFS \$	10,000.00	15,000	150,000,000
	Miscellaneous Above Cost (except fish screens) @ 10%			\$	800,000
	<b>SUBTOTAL INTAKE FACILITIES</b>				<b>158,800,000</b>
XVIII.	<b>PUMPING PLANT</b>				
	Q=15,000 cfs, TDH = 10 feet, 11 each at 2,280 HP units (1 standby)				
	Pumps and Prime Movers	LS \$	35,864,000.00	1	35,864,000
	Structures and Improvements	LS \$	19,544,000.00	1	19,544,000
	Electrical Equipment	LS \$	3,698,000.00	1	3,698,000
	<b>SUBTOTAL PUMPING PLANT</b>				<b>59,106,000</b>
<b>WESTERN 15,000 CFS INTAKE ON OLD RIVER AT NORTHERN END OF HOLLAND TRACT</b>					
XIX.	<b>INTAKE FACILITIES</b>				
	20'X50' Radial Gates	EA \$	510,000.00	5	2,550,000
	Concrete	CY \$	600.00	8,000	4,800,000
	Dewatering	LS \$	150,000.00	1	150,000
	Electrical Works	LS \$	500,000.00	1	500,000
	Fish Screens	CFS \$	10,000.00	15,000	150,000,000

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

**FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMHD**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Miscellaneous Above Cost (except fish screens) @ 10%			\$	800,000
	SUBTOTAL INTAKE FACILITIES				158,800,000
XX.	STRENGTHENING OF EXISTING LEVEES				
	Strengthening of West Levee of Old River North of Hwy. 4				
	and East Levee of Old River South of Hwy. 4 and all the way around Holland Tract (which will be inundated) with Riprap, Bedding, and Geotextile	LF	\$ 319.32	109,680	35,023,018
	SUBTOTAL STRENGTHENING OF EXISTING LEVEES				35,023,018
XXI.	CONSTRUCT NEW SETBACK LEVEES				
	Construct New Setback Levees for Conveyance Channel, with Riprap, Bedding, and Geotextile on Channel	LF	\$ 1,433.30	66,000	94,597,800
	Fencing	LF	\$ 5.00	66,000	330,000
	SUBTOTAL CONSTRUCT NEW SETBACK CHANNEL				94,927,800
XXII.	ROCK SLOUGH SIPHON				
	6- 30'x30' Concrete Box	CY	\$ 600.00	86,800	52,080,000
	Riprap	CY	\$ 50.00	25,000	1,250,000
	Dewatering	LS	\$ 200,000.00	1	200,000
	Miscellaneous @ 5%			\$	2,676,500
	SUBTOTAL ROCK-SLOUGH SIPHON				56,206,500
XXIII.	MOKELUMNE AQUEDUCT AND RAILROAD SIPHON				
	6-30'x30' Concrete Box	CY	\$ 600.00	161,200	96,720,000
	Riprap	CY	\$ 50.00	25,000	1,250,000
	Dewatering	LS	\$ 1,500,000.00	1	1,500,000
	Railroad Detour	LS	\$ 500,000.00	1	500,000
	Miscellaneous @ 5%			\$	4,998,500
	SUBTOTAL MOKELUMNE RIVER AQUEDUCT AND R.R. SIPHON				104,908,500
XXIV.	INDIAN SLOUGH SIPHON				
	6- 30'x30' Concrete Box	CY	\$ 600.00	86,800	52,080,000
	Riprap	CY	\$ 50.00	25,000	1,250,000
	Dewatering	LS	\$ 200,000.00	1	200,000
	Miscellaneous @ 5%			\$	2,676,500
	SUBTOTAL INDIAN SLOUGH SIPHON				56,206,500
XXV.	OLD RIVER AND HWY. 4 BRIDGE SIPHON				
	6- 30'x30' Concrete Box	CY	\$ 600.00	74,400	44,640,000
	Riprap	CY	\$ 50.00	25,000	1,250,000
	Dewatering	LS	\$ 500,000.00	1	500,000
	Hwy. 4 Bridge	SF	\$ 100.00	84,000	8,400,000
	Miscellaneous @ 5%			\$	2,739,500
	SUBTOTAL OLD RIVER AND HWY. 4 BRIDGE SIPHON				75,299,500
XXVI.	OLD RIVER SIPHON INTO CLIFTON COURT FOREBAY				
	6- 30'x30' Concrete Box	CY	\$ 600.00	161,200	96,720,000
	20'X50' Radial Gates	EA	\$ 510,000.00	5	2,550,000
	Transition Concrete (Forebay)	CY	\$ 600.00	4,000	2,400,000
	Riprap	CY	\$ 50.00	25,000	1,250,000
	Dewatering and Cofferdam	LS	\$ 1,000,000.00	1	1,000,000
	Miscellaneous @ 5%			\$	5,196,000

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMHD

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
SUBTOTAL OF OLD RIVER SIPHON					109,116,000
XXVII. RELOCATION OF IRRIGATION DIVERSIONS AND DRAINAGE PUMPS					
Holland Tract	AC \$	1,000.00		2,000	2,000,000
Palm Tract	AC \$	1,000.00		2,000	2,000,000
Orwood Tract	AC \$	1,000.00		2,000	2,000,000
Byron Tract	AC \$	1,000.00		2,000	2,000,000
Victoria Island	AC \$	1,000.00		2,400	2,400,000
Miscellaneous @ 10%				\$	1,040,000
SUBTOTAL RELOCATION IRRIGATION DIVERSIONS AND DRAINAGE PUMPS					11,440,000
XXVIII. LAND COST					
Holland Tract	AC \$	3,000.00		4,060	12,180,000
Palm Tract	AC \$	3,000.00		505	1,515,000
Orwood Tract	AC \$	3,000.00		264	792,000
Byron Tract	AC \$	3,000.00		280	840,000
Victoria Island	AC \$	3,000.00		309	927,000
SUBTOTAL RAILROAD BRIDGE					16,254,000
EASTERN 5,000 CFS INTAKE ON SAN JOAQUIN RIVER AT EASTERN SIDE OF UPPER ROBERTS					
XXIX. INTAKE FACILITIES					
Intake Facility From San Joaquin River	LS \$	55,070,000.00		1	55,070,000
Fish Screening Facility	CFS \$	10,000.00		5,000	50,000,000
Miscellaneous Cost @ 20%				\$	21,014,000
SUBTOTAL INTAKE FACILITIES					126,084,000
XXX. PUMPING PLANT					
5,000 cfs, TDH - 10 feet, HP - 8,360)	LS \$	29,902,000.00		1	29,902,000
SUBTOTAL PUMPING PLANT					29,902,000
XXXI. EARTH CANAL					
Embankment	CY \$	2.00		12,106,000	24,212,000
Compacted Embankment	CY \$	0.80		2,648,000	2,118,400
Common Embankment	CY \$	0.50		1,334,000	667,000
Strengthening of Existing Levee - North Levee o LF	\$	319.32		40,000	12,772,800
Fencing	LF \$	5.00		146,000	730,000
SUBTOTAL EARTH CANAL					130,200
XXXII. MIDDLE RIVER SIPHON					
Temporary River Realignment	LS \$	7,527,254.00		1	7,527,254
Dewatering	LS \$	119,101.00		1	119,101
Siphon - Concrete Including Rebar Earthworks	CY \$	600.00		15,600	9,360,000
Riprap	TON \$	27.00		42,852	1,157,004
Access Road	MILE \$	526,442.00		0	142,139
Inlet and Outlet Transitions - Concrete	CY \$	600.00		6,400	3,840,000
Miscellaneous @ 20%				\$	4,429,100
SUBTOTAL MIDDLE RIVER SIPHON					26,574,536
XXXIII. OLD RIVER SIPHON					

Description: **Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood**

FACILITY GROUPING: DELTA CONVEYANCE  
CODE: HCMHD

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	3-26'X26' Concrete Box Including Rebar & E: CY	CY \$	600.00	11,700	7,020,000
	Transitions Concrete	CY \$	600.00	6,400	3,840,000
	Compacted Embankment	CY \$	2.80	90,000	252,000
	Sand and Gravel Bedding	CY \$	50.00	4,000	200,000
	Riprap	CY \$	50.00	16,000	800,000
	Replace Levee Road	LF \$	23.00	1,100	25,300
	Cofferdams (2)	CY \$	2.80	72,000	201,600
	Remove Old Levees and Two Cofferdams	CY \$	1.50	204,000	306,000
	Bypass Channel	LF \$	1,183,256.00	1	1,183,256
	Dewatering	LF \$	1,158,605.00	1	1,158,605
	<b>SUBTOTAL OLD RIVER SIPHON</b>				<b>\$ 14,986,761</b>
XXXIV.	<b>FARM AND PRIVATE ROAD BRIDGES</b>				
	8 Bridges @ 12,000 sq. ft.	SF \$	100.00	96,000	9,600,000
	<b>SUBTOTAL FARM AND PRIVATE ROAD BRIDGES</b>				<b>\$ 9,600,000</b>
XXXV.	<b>COUNTY ROAD BRIDGES</b>				
	One Bridge	SF \$	100.00	16,800	1,680,000
	<b>SUBTOTAL COUNTY ROAD BRIDGES</b>				<b>\$ 1,680,000</b>
XXXVI.	<b>RELOCATION OF IRRIGATION DIVERSIONS AND DRAINAGE PUMPS</b>				
	Union Island	AC \$	1,000.00	8,350	8,350,000
	Miscellaneous @ 10%				\$ 835,000
	<b>SUBTOTAL RELOCATION OF IRRIGATION DIVERSIONS AND DRAINAGE PUMPS</b>				<b>\$ 9,185,000</b>
XXXVII.	<b>LAND COST</b>	AC \$	3,000.00	3,352	10,056,000
	<b>SUBTOTAL LAND COSTS</b>				<b>\$ 10,056,000</b>
	<b>CONSTRUCTION TOTAL FOR MULTIPLE INTAKES ALTERNATIVE 3I:</b>				<b>\$ 31,961,000,000</b>

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 522,400,000  
Last Update November 3, 1997

## ISOLATED CONVEYANCE FACILITY

Description: **5,000 cfs Isolated Open Channel Facility with a diversion at Hood**

**FACILITY GROUPING: DELTA CONVEYANCE  
CODE: GCOC05**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	INTAKE FACILITIES				
	Intake Facility From Sacramento River	LS	\$ 55,070,000.00		
	Fish Screening Facility	CFS	\$ 10,000.00	5,000	\$ 50,000,000
	Miscellaneous Cost @ 20%				\$ 21,014,000
	SUBTOTAL INTAKE FACILITIES				\$ 126,084,000
II.	BRIDGES				
	State Hwy. 24	SF	\$ 100.00	14,700	\$ 1,470,000
	State Hwy. 12	SF	\$ 100.00	14,700	\$ 1,470,000
	State Hwy. 4	SF	\$ 100.00	14,700	\$ 1,470,000
	Tracy Road	SF	\$ 100.00	14,700	\$ 1,470,000
	Lambert Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Laurel Lane	SF	\$ 100.00	10,500	\$ 1,050,000
	Walnut Grove Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Peltier Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Woodbridge Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Atherton Road	SF	\$ 100.00	10,500	\$ 1,050,000
	McDonal Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Calpack Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Bonatti Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Middle River O & M Road	SF	\$ 100.00	10,500	\$ 1,050,000
	Southern Pacific R. R.	LS	\$ 3,039,437.00	1	\$ 3,039,437
	Western Pacific R. R.	LS	\$ 3,011,581.00	1	\$ 3,011,581
	A. T. & S. F. R. R. - Main Line	LS	\$ 3,531,907.00	1	\$ 3,531,907
	SUBTOTAL BRIDGES				\$ 59,627,925
III.	CULVERTS (2)				
	Concrete Including Rebar and Earthworks	CY	\$ 600.00	285	\$ 171,000
	108" Dia. RCP	LF	\$ 324.00	3,420	\$ 1,108,080
	Intake Structures	LS	\$ 484,693.00	1	\$ 484,693
	Riprap	CY	\$ 50.00	3,400	\$ 170,000
	SUBTOTAL CULVERTS				\$ 1,933,773
IV.	PUMPING PLANT				
	5,000 cfs, TDH - 10 feet, HP - 8,360	LS	\$ 29,902,000.00	1	\$ 29,902,000
	SUBTOTAL PUMPING PLANT				\$ 29,902,000
V.	EARTH CANAL				
	Excavation	CY	\$ 2.00	36,018,000	\$ 72,036,000
	Compacted Embankment	CY	\$ 0.80	22,278,000	\$ 17,822,400
	Common Embankment	CY	\$ 0.50	4,802,000	\$ 2,401,000
	Borrow	CY	\$ 5.00	2,201,000	\$ 11,005,000

APPENDIX C 12.1

Description: **5,000 cfs Isolated Open Channel Facility with a diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC05**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Rights of Way	AC	\$ 5,000.00	5,330	\$ 26,650,000
	Relocation of Existing Property	LS	\$ 57,591,800.00	1	\$ 57,591,800
	Fencing	LF	\$ 5.00	464,000	\$ 2,320,000
	<b>SUBTOTAL EARTH CANAL</b>				<b>\$ 189,826,200</b>
VI.	<b>MOKELUMNE RIVER SIPHON</b>				
	3-26'X26' Concrete Box Including Rebar & E:	CY	\$ 600.00	15,600	\$ 9,360,000
	Transitions Concrete	CY	\$ 600.00	6,400	\$ 3,840,000
	Riprap	CY	\$ 50.00	18,000	\$ 900,000
	Sand and Gravel Bedding	CY	\$ 50.00	6,000	\$ 300,000
	Channel Excavation	CY	\$ 2.00	316,200	\$ 632,400
	Compacted Embankment	CY	\$ 0.80	191,400	\$ 153,120
	Temporary Dikes	CY	\$ 4.00	30,800	\$ 123,200
	Fill in Old River Bed	CY	\$ 2.00	125,000	\$ 250,000
	Level Abandoned Levee	CY	\$ 2.00	139,000	\$ 278,000
	Dewatering and Maintenance of Site	LS	\$ 1,274,875.00	1	\$ 1,274,875
	<b>SUBTOTAL MOKELUMNE RIVER SIPHON</b>				<b>\$ 1,111,595</b>
VII.	<b>SAN JOAQUIN RIVER SIPHON</b>				
	Dewatering and Pumping	LS	\$ 1,015,628.00	1	\$ 1,015,628
	Strip and Waste Peat	CY	\$ 2.00	44,000	\$ 88,000
	3-26'X26' Concrete Box Including Rebar & E:	CY	\$ 600.00	15,130	\$ 9,078,000
	Transitions Concrete	CY	\$ 600.00	6,400	\$ 3,840,000
	Trench Excavation	CY	\$ 2.00	439,000	\$ 878,000
	Spoil Unsuitable Material	CY	\$ 2.00	54,000	\$ 108,000
	Compacted Embankment	CY	\$ 0.80	24,200	\$ 19,360
	Riprap	CY	\$ 50.00	13,100	\$ 655,000
	Gravel Bedding	CY	\$ 50.00	3,200	\$ 160,000
	Sand Backfill	CY	\$ 4.00	367,400	\$ 1,469,600
	Open Joint Tile - 6" Dia.	LF	\$ 2.00	9,200	\$ 18,400
	Gravel Filter	CY	\$ 50.00	650	\$ 32,500
	Sheet Piling	SF	\$ 25.00	21,000	\$ 525,000
	Timber Piling	EA	\$ 1,356.00	250	\$ 339,000
	Placing Fabricated Barrel Units	LS	\$ 2,489,767.00	1	\$ 2,489,767
	Casting Basin	LS	\$ 3,204,651.00	1	\$ 3,204,651
	Slide Gates and Hoists	LS	\$ 147,907.00	1	\$ 147,907
	<b>SUBTOTAL SAN JOAQUIN RIVER SIPHON</b>				<b>\$ 21,068,813</b>
VIII.	<b>OLD RIVER SIPHON</b>				
	3-26'X26' Concrete Box Including Rebar & E:	CY	\$ 600.00	11,700	\$ 7,020,000
	Transitions Concrete	CY	\$ 600.00	6,400	\$ 3,840,000
	Compacted Embankment	CY	\$ 2.80	90,000	\$ 252,000
	Sand and Gravel Bedding	CY	\$ 50.00	4,000	\$ 200,000
	Riprap	CY	\$ 50.00	16,000	\$ 800,000
	Replace Levee Road	LF	\$ 23.00	1,100	\$ 25,300
	Cofferdams (2)	CY	\$ 2.80	72,000	\$ 201,600
	Remove Old Levees and Two Cofferdams	CY	\$ 1.50	204,000	\$ 306,000
	Bypass Channel	LF	\$ 1,183,256.00	1	\$ 1,183,256
	Dewatering	LF	\$ 1,158,605.00	1	\$ 1,158,605
	<b>SUBTOTAL OLD RIVER SIPHON</b>				<b>\$ 14,886,761</b>
IX.	<b>MIDDLE RIVER SIPHON</b>				

Description: **5,000 cfs Isolated Open Channel Facility with a diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC05**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Temporary River Realignment	LS \$	7,527,254.00	1 \$	7,527,254
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar Earthworks	CY \$	600.00	15,600 \$	9,360,000
	Riprap	TON \$	27.00	42,852 \$	1,157,004
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	4,429,100
	<b>SUBTOTAL MIDDLE RIVER SIPHON</b>				<b>26,574,598</b>
X.	<b>14-MILE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	2,596,476.00	1 \$	2,596,476
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar Earthworks	CY \$	600.00	6,500 \$	3,900,000
	Riprap	TON \$	27.00	2,444 \$	65,988
	Access Road	TON \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	2,132,741
	<b>SUBTOTAL 14-MILE SLOUGH SIPHON</b>				<b>12,706,443</b>
XI.	<b>WHITE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	960,254.00	1 \$	960,254
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	2,600 \$	1,560,000
	Riprap	TON \$	27.00	15,630 \$	422,010
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	1,408,701
	<b>SUBTOTAL WHITE SLOUGH SIPHON</b>				<b>8,432,205</b>
XII.	<b>SYCAMORE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	528,561.00	1 \$	528,561
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	1,300 \$	780,000
	Riprap	TON \$	27.00	13,296 \$	358,992
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	1,153,759
	<b>SUBTOTAL SYCAMORE SLOUGH SIPHON</b>				<b>6,922,552</b>
XIII.	<b>HOG SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	781,259.00	1 \$	781,259
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	1,950 \$	1,170,000
	Riprap	TON \$	27.00	14,852 \$	401,004
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	1,290,701
	<b>SUBTOTAL HOG SLOUGH SIPHON</b>				<b>7,743,003</b>

Description: **5,000 cfs Isolated Open Channel Facility with a diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC05**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>XIV. BEAVER SLOUGH SIPHON</b>					
	Temporary River Realignment	LS \$	2,667,021.00	1 \$	2,667,021
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	6,500 \$	3,900,000
	Riprap	TON \$	27.00	24,963 \$	674,001
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	2,268,452
	<b>SUBTOTAL BEAVER SLOUGH SIPHON</b>				<b>13,910,714</b>
<b>XV. LOST SLOUGH SIPHON</b>					
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	3,250 \$	1,950,000
	Riprap	TON \$	27.00	17,963 \$	485,001
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	1,307,248
	<b>SUBTOTAL LOST SLOUGH SIPHON</b>				<b>5,243,489</b>
<b>XVI. SNODGRASS SLOUGH SIPHON</b>					
	Temporary River Realignment	LS \$	1,000,265.00	1 \$	1,000,265
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	2,600 \$	1,560,000
	Riprap	TON \$	27.00	16,667 \$	450,009
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	6,400 \$	3,840,000
	Miscellaneous @ 20%			\$	1,422,303
	<b>SUBTOTAL SNODGRASS SLOUGH SIPHON</b>				<b>8,333,817</b>
<b>CONSTRUCTION TOTAL FOR 5,000 CFS ISOLATED FACILITY</b>					
					<b>522,400,000</b>

**Footnote:**

\*LS=lump sum; AC=acre; MI=mile; CY=cubic yard; LF=linear foot; LB=pound; SF=square foot; EA=each

**Cost References:**

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 789,700,000  
Last Update November 3, 1997

## ISOLATED CONVEYANCE FACILITY

Description: **15,000 cfs Isolated Open Channel Facility with a Diversion at Hood**

**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC15**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>I. INTAKE FACILITIES</b>					
	Intake Facilities From Sacramento River	LS	\$ 45,906,000.00	1	\$ 45,906,000
	Fish Screens	CFS	\$ 10,000.00	15,000	\$ 150,000,000
	Miscellaneous Cost @ 20%				\$ 39,181,200
	<b>SUBTOTAL INTAKE FACILITIES</b>				<b>\$ 35,087,200</b>
<b>II. PUMPING PLANT</b>					
	15,000 cfs, TDH - 10 feet, HP = 25,080	LS	\$ 57,807,000.00	1	\$ 57,807,000
	<b>SUBTOTAL PUMPING PLANT</b>				<b>\$ 57,807,000</b>
<b>III. EARTH CANAL</b>					
	Excavation	CY	\$ 2.00	69,373,000	\$ 138,746,000
	Compacted Embankment	CY	\$ 0.80	31,002,000	\$ 24,801,600
	Common Embankment	CY	\$ 0.50	6,403,000	\$ 3,201,500
	Rights of Way	AC	\$ 5,000.00	5,330	\$ 26,650,000
	Relocation of Existing Property	LS	\$ 57,591,800.00	1	\$ 57,591,800
	Fencing	LF	\$ 5.00	464,000	\$ 2,320,000
	<b>SUBTOTAL EARTH CANAL</b>				<b>\$ 254,109,600</b>
<b>IV. BRIDGES</b>					
	State Hwy. 24	SF	\$ 100.00	22,680	\$ 2,268,000
	State Hwy. 12	SF	\$ 100.00	22,680	\$ 2,268,000
	State Hwy. 4	SF	\$ 100.00	22,680	\$ 2,268,000
	Tracy Road	SF	\$ 100.00	22,680	\$ 2,268,000
	Lambert Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Laurel Lane	SF	\$ 100.00	16,200	\$ 1,620,000
	Walnut Grove Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Peltier Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Woodbridge Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Atherton Road	SF	\$ 100.00	16,200	\$ 1,620,000
	McDonald Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Calpack Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Bonatti Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Middle River O & M Road	SF	\$ 100.00	16,200	\$ 1,620,000
	Southern Pacific R. R.	LS	\$ 3,039,437.00	1	\$ 3,039,437
	Western Pacific R. R.	LS	\$ 3,011,581.00	1	\$ 3,011,581
	A. T. & S. F. R. R. - Main Line	LS	\$ 3,531,907.00	1	\$ 3,531,907
	<b>SUBTOTAL BRIDGES</b>				<b>\$ 34,425,000</b>
<b>V. CULVERTS (2)</b>					
	Concrete Including Rebar and Earthworks	CY	\$ 600.00	285	\$ 171,000
	108" Dia. RCP	LF	\$ 324.00	3,420	\$ 1,108,080
	Intake Structures	LS	\$ 484,693.00	1	\$ 484,693
	Riprap	CY	\$ 50.00	3,400	\$ 170,000

Description: **15,000 cfs Isolated Open Channel Facility with a Diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC15**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>SUBTOTAL CULVERTS</b>					<b>1933,773</b>
VI.	<b>MOKELUMNE RIVER SIPHON</b>				
	6-30'X30' Concrete Box Including Rebar & E:	CY \$	600.00	33,600	20,160,000
	Transitions Concrete	CY \$	600.00	7,000	4,200,000
	Riprap	CY \$	50.00	27,180	1,359,000
	Sand and Gravel Bedding	CY \$	50.00	9,060	453,000
	Channel Excavation	CY \$	2.00	477,500	955,000
	Compacted Embankment	CY \$	0.80	289,000	231,200
	Temporary Dikes	CY \$	4.00	46,500	186,000
	Fill in Old River Bed	CY \$	2.00	189,000	378,000
	Level Abandoned Levee	CY \$	2.00	210,000	420,000
	Dewatering and Maintenance of Site	LS \$	1,274,875.00	1	1,274,875
	<b>SUBTOTAL MOKELUMNE RIVER SIPHON</b>				<b>2,617,475</b>
VII.	<b>SAN JOAQUIN RIVER SIPHON</b>				
	Dewatering and Pumping	LS \$	1,015,628.00	1	1,015,628
	Strip and Waste Peat	CY \$	2.00	66,400	132,800
	6-30'X30' Concrete Box Including Rebar & E:	CY \$	600.00	32,590	19,554,000
	Transitions Concrete	CY \$	600.00	7,000	4,200,000
	Trench Excavation	CY \$	2.00	663,000	1,326,000
	Spoil Unsuitable Material	CY \$	2.00	82,000	164,000
	Compacted Embankment	CY \$	0.80	37,000	29,600
	Riprap	CY \$	50.00	19,800	990,000
	Gravel Bedding	CY \$	50.00	4,800	240,000
	Sand Backfill	CY \$	4.00	554,800	2,219,200
	Open Joint Tile - 6" Dia.	LF \$	2.00	13,900	27,800
	Gravel Filter	CY \$	50.00	980	49,000
	Sheet Piling	SF \$	25.00	32,000	800,000
	Timber Piling	EA \$	1,356.00	380	515,280
	Placing Fabricated Barrel Units	LS \$	3,760,000.00	1	3,760,000
	Casting Basin	LS \$	4,840,000.00	1	4,840,000
	Slide Gates and Hoists	LS \$	223,000.00	1	223,000
	<b>SUBTOTAL SAN JOAQUIN RIVER SIPHON</b>				<b>40,086,308</b>
VIII.	<b>OLD RIVER SIPHON</b>				
	6-30'X30' Concrete Box Including Rebar & E:	CY \$	600.00	25,200	15,120,000
	Transitions Concrete	CY \$	600.00	7,000	4,200,000
	Compacted Embankment	CY \$	0.80	136,000	108,800
	Sand and Gravel Bedding	CY \$	50.00	6,040	302,000
	Riprap	CY \$	50.00	24,000	1,200,000
	Replace Levee Road	LF \$	23.00	1,700	39,100
	Cofferdams (2)	CY \$	2.80	72,000	201,600
	Remove Old Levees and Two Cofferdams	CY \$	1.50	204,000	306,000
	Bypass Channel	LF \$	1,183,256.00	1	1,183,256
	Dewatering	LF \$	1,158,605.00	1	1,158,605
	<b>SUBTOTAL OLD RIVER SIPHON</b>				<b>26,319,361</b>
IX.	<b>MIDDLE RIVER SIPHON</b>				
	Temporary River Realignment	LS \$	7,527,254.00	1	7,527,254

Description: **15,000 cfs Isolated Open Channel Facility with a Diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC15**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar Earthworks	CY \$	600.00	23,560 \$	14,136,000
	Riprap	TON \$	27.00	64,710 \$	1,747,170
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	5,574,333
	<b>SUBTOTAL MIDDLE RIVER SIPHON</b>				<b>33,445,997</b>
X.	<b>14-MILE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	2,596,476.00	1 \$	2,596,476
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar Earthworks	CY \$	600.00	9,820 \$	5,892,000
	Riprap	TON \$	27.00	3,690 \$	99,630
	Access Road	TON \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	2,609,869
	<b>SUBTOTAL 14-MILE SLOUGH SIPHON</b>				<b>15,659,215</b>
XI.	<b>WHITE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	960,254.00	1 \$	960,254
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	3,930 \$	2,358,000
	Riprap	TON \$	27.00	23,600 \$	637,200
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	1,683,339
	<b>SUBTOTAL WHITE SLOUGH SIPHON</b>				<b>10,410,038</b>
XII.	<b>SYCAMORE SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	528,561.00	1 \$	528,561
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	1,960 \$	1,176,000
	Riprap	TON \$	27.00	20,080 \$	542,160
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	1,341,592
	<b>SUBTOTAL SYCAMORE SLOUGH SIPHON</b>				<b>8,049,553</b>
XIII.	<b>HOG SLOUGH SIPHON</b>				
	Temporary River Realignment	LS \$	781,259.00	1 \$	781,259
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	2,950 \$	1,770,000
	Riprap	TON \$	27.00	22,430 \$	605,610
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	1,523,622
	<b>SUBTOTAL HOG SLOUGH SIPHON</b>				<b>9,141,231</b>

Description: **15,000 cfs Isolated Open Channel Facility with a Diversion at Hood**
**FACILITY GROUPING: DELTA CONVEYANCE**  
**CODE: GCOC15**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
XIV.	BEAVER SLOUGH SIPHON				
	Temporary River Realignment	LS \$	2,667,021.00	1 \$	2,667,021
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	9,820 \$	5,892,000
	Riprap	TON \$	27.00	37,700 \$	1,017,900
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	2,807,632
	<b>SUBTOTAL BEAVER SLOUGH SIPHON</b>				<b>16,345,793</b>
XV.	LOST SLOUGH SIPHON				
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	4,910 \$	2,946,000
	Riprap	TON \$	27.00	27,100 \$	731,700
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	1,627,788
	<b>SUBTOTAL LOST SLOUGH SIPHON</b>				<b>9,766,728</b>
XVI.	SNODGRASS SLOUGH SIPHON				
	Temporary River Realignment	LS \$	1,000,265.00	1 \$	1,000,265
	Dewatering	LS \$	119,101.00	1 \$	119,101
	Siphon - Concrete Including Rebar and Earthw	CY \$	600.00	3,930 \$	2,358,000
	Riprap	TON \$	27.00	25,200 \$	680,400
	Access Road	MILE \$	526,442.00	0 \$	142,139
	Inlet and Outlet Transitions - Concrete	CY \$	600.00	7,000 \$	4,200,000
	Miscellaneous @ 20%			\$	1,699,981
	<b>SUBTOTAL SNODGRASS SLOUGH SIPHON</b>				<b>10,199,885</b>

CONSTRUCTION TOTAL FOR 15,000 CFS ISOLATED FACILITY

**789,700,000**

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate \$ 540,800,000  
Last Update November 3, 1997

## DELTA STORAGE

Description: In-Delta Storage typical with flooding of Victoria, Woodward and Bacon Islands, siphons used to convey water through interior canals

**FACILITY GROUPING: DELTA STORAGE**  
**CODE: DRIDTY**

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
I.	BACON ISLAND				
	Land Acquisition	AC	\$3,000	5,066	15,198,000
	Reinforce Levees				
	Riprap	TON	\$16.70	914,600	15,273,820
	Bedding (6" thick)	TON	\$15.60	258,500	4,032,600
	Geotextile (bedding)	SF	\$0.28	5,818,200	1,629,096
	Embankment	CY	\$7.80	297,100	2,317,380
	Pump Station w/ fish screens (Q=5,000 cfs)	LS	\$80,574,000	JOB	80,574,000
	Bacon-Woodward Siphon (1500') <sup>b</sup>				
	Temporary River Alignment				
	Excavation	CY	\$2.50	75,615	189,038
	Levees (using excavation)	CY	\$3.00	75,615	226,845
	Cofferdam Sheetpiling	SF	\$28.70	226,200	6,491,940
	Cofferdam Gravel Fill	CY	\$21.50	22,200	477,300
	Backfill	CY	\$4.00	75,615	302,460
	Dewatering	LS	\$102,500	JOB	102,500
	Siphon				
	Excavation-Structural	CY	\$6.00	255,000	1,530,000
	Concrete	CY	\$296	27,000	7,992,000
	Reinforcing Steel	LBS	\$0.65	5,310,000	3,451,500
	Backfill	CY	\$4.00	133,500	534,000
	Riprap	TON	\$27.00	40,500	1,093,500
	Access Roads	MI	\$513,000	0	133,380
	Inlet and Outlet Transition				
	Excavation	CY	\$2.25	51,400	115,650
	Concrete Slab	CY	\$242	1,370	331,540
	Concrete Walls	CY	\$377	1,090	410,930
	Reinforcing Steel	LBS	\$0.65	490,000	318,500
	Backfill	CY	\$4.00	11,500	46,000
	Miscellaneous @ 20%				\$4,749,417
	<b>SUBTOTAL BACON ISLAND</b>				<b>147,521,395</b>
II.	WOODWARD ISLAND				
	Land Acquisition	AC	\$3,000	1,565	4,695,000
	Reinforce Levees				
	Riprap	TON	\$16.70	561,600	9,378,720
	Bedding (6" thick)	TON	\$15.60	158,800	2,477,280
	Geotextile (bedding)	SF	\$0.28	3,572,400	1,000,272
	Embankment	CY	\$7.80	182,500	1,423,500
	Woodward-Victoria Siphon(700') <sup>b</sup>				
	Temporary River Alignment				
	Excavation	CY	\$2.50	35,287	88,218
	Levees (using excavation)	CY	\$3.00	35,287	105,861

Description: In-Delta Storage typical with flooding of Victoria, Woodward and Bacon Islands, siphons used to convey water through interior canals

## FACILITY GROUPING: DELTA STORAGE

CODE: DRIDTY

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Cofferdam Sheetpiling	SF	\$28.70	150,800	4,327,960
	Cofferdam Gravel Fill	CY	\$21.50	14,800	318,200
	Backfill	CY	\$4.00	35,287	141,148
	Dewatering	LS	\$102,500	JOB	102,500
	Siphon				
	Excavation-Structural	CY	\$6.00	119,000	714,000
	Concrete	CY	\$296	12,600	3,729,600
	Reinforcing Steel	LBS	\$0.65	2,478,000	1,610,700
	Backfill	CY	\$4.00	62,300	249,200
	Riprap	TON	\$27.00	18,900	510,300
	Access Roads	MI	\$513,000	0.12	61,560
	Inlet and Outlet Transition				
	Excavation	CY	\$2.25	51,400	115,650
	Concrete Slab	CY	\$242	1,370	331,540
	Concrete Walls	CY	\$377	1,090	410,930
	Reinforcing Steel	LBS	\$0.65	490,000	318,500
	Backfill	CY	\$4.00	11,500	46,000
	Miscellaneous @ 20%				\$2,636,373
	<b>SUBTOTAL WOODWARD ISLAND</b>				<b>4,793,012</b>
III.	<b>VICTORIA ISLAND</b>				
	Land Acquisition	AC	\$3,000	6,767	20,301,000
	Reinforce Levees				
	Riprap	TON	\$16.70	973,500	16,257,450
	Bedding (6" thick)	TON	\$15.60	275,200	4,293,120
	Geotextile (bedding)	SF	\$0.28	6,192,500	1,733,900
	Embankment	CY	\$7.80	316,200	2,466,360
	Elevated Roadway (Highway 4)				
	Riprap	TON	\$16.70	570,200	9,522,340
	Bedding (6" thick)	TON	\$15.60	161,200	2,514,720
	Geotextile	SF	\$0.28	3,627,500	1,015,700
	Embankment	CY	\$7.80	819,800	6,394,440
	Foundation	CY	\$10.88	740,100	8,052,288
	Aggregate Base	TON	\$19.15	14,980	286,867
	Asphalt Concrete	TON	\$58.92	6,810	401,245
	Causeway Bridge	SF	\$100	21,000	2,100,000
	Victoria - CCFB Siphon (1400)				
	Temporary River Alignment				
	Excavation	CY	\$2.50	70,574	176,435
	Levees	CY	\$3.00	70,574	211,722
	Cofferdam Sheetpiling	SF	\$28.70	150,800	4,327,960
	Cofferdam Gravel Fill	CY	\$21.50	14,800	318,200
	Backfill	CY	\$4.00	70,574	282,296
	Dewatering	LS	\$102,500	JOB	102,500
	Siphon				
	Excavation-Structural	CY	\$6.00	700,000	4,200,000
	Concrete	CY	\$296	72,800	21,548,800
	Reinforcing Steel	LBS	\$0.65	14,546,000	9,454,900
	Backfill	CY	\$4.00	364,000	1,456,000
	Riprap	TON	\$27	110,600	2,986,200
	Access Roads	MI	\$513,000	0.70	359,100

Description: In-Delta Storage typical with flooding of Victoria, Woodward and Bacon Islands, syphons used to convey water through interior canals

FACILITY GROUPING: DELTA STORAGE  
CODE: DRDITY

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>Inlet and Outlet Transition</b>					
	Excavation	CY	\$2.25	101,220	227,745
	Concrete Slab	CY	\$242	2,690	650,980
	Concrete Walls	CY	\$377	2,140	806,780
	Reinforcing Steel	LBS	\$0.65	966,000	627,900
	Backfill	CY	\$4.00	22,560	90,240
	Radial Gates and Hoist Assemblies	EA	\$145,000	2	290,000
	Miscellaneous Siphon Costs @ 20%			\$	9,623,552
	Victoria Island Pumping Plant (Q=15,000 cfs)	LS	\$59,106,000	JOB	59,106,000
	Distributed Pump Station w/ Fish Screens (Q=5,000 cfs)	EA	\$80,575,000	2	161,150,000
	<b>SUBTOTAL VICTORIA ISLAND</b>				<b>\$161,150,000</b>
	<b>SEEPAGE INTERCEPTION WELLS</b>	LS	\$5,174,000	JOB	<b>5,174,000</b>
	<b>SUBTOTAL SEEPAGE WELLS</b>				<b>\$5,174,000</b>
	<b>CONSTRUCTION TOTAL FOR IN-DELTA STORAGE</b>				<b>\$166,804,000</b>

1. Bookman-Edmonston Engineering, CALFED Storage and Conveyance Components - Facility Descriptions and Cost Estimates, October 1997.

## **APPENDIX D**

### **GROUNDWATER STORAGE FACILITY COMPONENTS**

### **BASE CONSTRUCTION ESTIMATES**

**GROUNDWATER STORAGE FACILITIES**

<b>DESCRIPTION</b>	<b>PAGE</b>
Eastern Sutter County Conjunctive Use Project (Active Storage Capacity = 280 TAF)	<b>D 1.1</b>
Thomes Creek Fan Conjunctive Use Project (Active Storage Capacity = 220 TAF)	<b>D 2.1</b>
Yuba County Conjuctive Use through In-Lieu Operations (Active Storage Capacity = 280 TAF)	<b>D 3.1</b>
Kern River Fan Groundwater Banking Project (Active Storage Capacity = 930 TAF)	<b>D 4.1</b>
Madera Ranch Groundwater Banking Project (Active Storage Capacity = 350 TAF)	<b>D 5.1</b>
Folsom South Canal Area Conjuctive Use Project ( Active Storage Capacity = 740 TAF)	<b>D 6.1</b>

**TABLE D**

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$35,000,000  
Revision Date: October 1997

**NORTH OF DELTA GROUNDWATER STORAGE**

Description: Eastern Sutter County Conjunctive Use Project (Active Storage Capacity = 280 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ARES02

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 125.00	280,000	\$35,000,000

Cost References:

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997

California Department of Water Resources, Aug 1978, Evaluation of Ground Water Resources: Sacramento Valley, Bulletin 118-6, State of California

APPENDIX D 1.1

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$28,160,000  
Revision Date: October 1997

## NORTH OF DELTA GROUNDWATER STORAGE

Description: Thomas Creek Fan Conjunctive Use Project (Active Storage Capacity = 220 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ARTC02

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 128.00	220,000	\$28,160,000

**Cost References:**

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997

California Department of Water Resources, Aug 1978, Evaluation of Ground Water Resources: Sacramento Valley, Bulletin 118-6, State of California

## APPENDIX D 2.1

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$31,080,000  
Revision Date: October 1997

## NORTH OF DELTA GROUNDWATER STORAGE

Description: Yuba County Conjunctive Use through In-Lieu Operations (Active Storage Capacity = 280 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ARYC02

ITEM No	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 111.00	280,000	\$31,080,000

**Cost References:**

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997  
Bookman-Edmonston Engineering, Inc., Sept. 1992, Ground Water Resources and Management in Yuba Co.

### APPENDIX D 3.1

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$124,620,000  
Revision Date: October 1997

## SOUTH OF DELTA GROUNDWATER STORAGE

Description: Kern River Fan Groundwater Banking Project (Active Storage Capacity = 930 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ERKR09

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 134.00	930,000	\$124,620,000

Cost References:

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997

California Department of Water Resources, Aug 1987, *Kern Fan Element, Kern Water Bank*, State of California

## APPENDIX D 4.1

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$59,850,000  
Revision Date: October 1997

## SOUTH OF DELTA GROUNDWATER STORAGE

Description: Madera Ranch Groundwater Banking Project (Active Storage Capacity = 350 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ERMR03

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 171.00	350,000	\$59,850,000

**Cost References:**

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997  
Bookman-Edmonston Engineering, Inc., Sept. 1996, correspondence to USBR concerning Madera Ranch

### APPENDIX D 5.1

4/29/98

PRELIMINARY COST SUMMARY

DRAFT

CALFED Bay Delta Program  
Technical Services Branch

Construction Estimate: \$103,600,000  
Revision Date: October 1997

**SOUTH OF DELTA GROUNDWATER STORAGE**

Description: Folsom South Canal Area Conjunctive Use Project ( Active Storage Capacity = 740 TAF)

FACILITY GROUPING: GROUND WATER STORAGE  
CODE: ERFS07

ITEM No.	ITEM	UNIT	UNIT COST	QUANTITY	ITEM COST
	Unit Cost (\$/Acre-foot)	AF	\$ 140.00	740,000	\$103,600,000

**Cost References:**

CALFED Bay-Delta Program Storage and Conveyance Component Inventories, March 7, 1997

California Department of Water Resources, 1990, *Historical Ground Water Levels in San Joaquin County*, State of California

Stockton East Water District, 1978, *Water Action Program*.

USBR, 1980, *Stanislaus River Basin Alternatives and Water Allocation Special Report*, Department of the Interior

USBR, 1972, *An Appraisal of Oakdale and South San Joaquin Irrigation Districts Stanislaus River Water Rights*, Department of the Interior

APPENDIX D 6.1

## **APPENDIX E**

### **CALFED FACILITY COMPONENTS DEVELOPMENT OF TOTAL CAPITAL AND TOTAL ANNUAL COSTS**

## CALFED Facility Components

(Million of 1996 Dollars)

Facility Component	Base Construction Estimate	Contingency Cost	Construction Cost	Engineering Cost	Regulatory Cost	Subtotal Cost	Forgone Investment Adjustment	TOTAL CAPITAL COST	Annual Capital Cost	Annual O&M Cost	Annual Energy Cost	TOTAL ANNUAL COST
		B	C	D	E	F	G					
		0.2 x B	B+C	0.35 x D	0.2 x D	D+E+F	H					
<b>SURFACE STORAGE</b>												
SACRAMENTO RIVER TRIBUTARY STORAGE												
Colusa Reservoir (3,300 taf)	916.8	183.3	1,099.9	385.0	220.0	1,704.9	232.9	1,937.8	122.9	16.5	5.5	144.9
Red Bank Project (359 taf)	132.6	26.5	159.1	55.7	31.8	246.7	33.7	280.4	17.8	2.4	0.8	21.0
Sites (1,200 taf)	309.5	61.9	371.5	130.0	74.3	575.8	78.8	654.4	41.5	5.6	1.9	48.9
Sites (1,900 taf)	445.3	89.1	534.4	187.0	106.9	828.3	113.2	941.5	59.7	8.0	2.7	70.4
Thornes-Newville Reservoir (1,840 taf)	934.7	186.9	1,121.7	392.6	224.3	1,738.6	237.5	1,976.1	125.4	16.8	5.6	147.8
SAN JOAQUIN RIVER TRIBUTARY STORAGE												
Montgomery Reservoir (240 taf)	155.9	31.2	187.1	65.5	37.4	290.0	39.6	329.6	20.9	2.8	0.9	24.7
OFF-AQUEDUCT STORAGE												
Los Banos Grandes (2,030 taf)	816.7	163.3	980.0	343.0	196.0	1,519.1	207.5	1,726.6	109.5	14.7	4.9	129.1
Los Vaqueros Enlargement (1,065)	1,124.1	224.8	1,348.9	472.1	269.8	2,090.8	285.6	2,376.4	150.8	20.2	6.7	177.7
<b>MAJOR RESERVOIR CONVEYANCE</b>												
(2a2) Enlarge existing T-C Canal from Red Bluff Diversion to Funks Reservoir (Reaches 1 through 5) - Screened Pump Alternative	236.9	47.4	284.3	99.5	56.9	440.6	13.2	453.8	28.8	4.3	1.4	34.5
(2a2) Enlarge existing T-C Canal structure from the Red Bluff Diversion to the Sour Grass Canal (Reaches 1 through 2) - Screened Pump Alternative	166.3	33.3	199.5	69.8	39.9	309.3	9.3	318.6	20.2	3.0	1.0	24.2
Chico Landing Intertie	252.7	50.5	303.2	106.1	60.6	470.0	14.1	484.1	30.7	4.5	1.5	38.8
<b>DELTA CONVEYANCE</b>												
CVF-SWP IMPROVEMENTS												
New Fish Screen @ Skinner; New Fish Screen @ Tracy; and Tracy/CCFB Intertie	174.5	34.9	209.4	73.3	41.9	324.6	44.3	368.9	23.4	3.1	1.0	27.6
New Fish Screen @ Skinner; New Fish Screen @ Tracy; New Intake at CCFB, and Tracy/CCFB Intertie	188.1	37.6	225.7	79.0	45.1	349.9	47.8	397.7	25.2	3.4	1.1	29.7
NORTH DELTA IMPROVEMENTS												
10,000 cfs Hood Diversion; Flooded McCormick Williamson; Setback Levees @ New Hope, Staten/Tyler, and Boulden	440.4	88.1	528.5	185.0	105.7	819.1	111.9	931.0	59.1	7.9	2.6	69.6
Setback Levees @ New Hope, Staten/Tyler, and Boulden	150.6	30.1	180.7	63.3	36.1	280.1	38.3	318.4	20.2	2.7	0.9	23.8
East Floodway; 10,000 cfs Hood Diversion; Flooded McCormick Williamson, Canal Ranch, Brack, and Boulden; Setback Levees @ New Hope, Temminous, and Staten	569.6	113.9	683.5	239.2	136.7	1,059.5	144.7	1,204.2	76.4	10.3	3.4	90.1
West Floodway; Wier Intake; Flooded McCormick Williamson, Tyler, and Boulden Islands; East Delta Habitat on Canal Ranch and Brack	272.5	54.5	327.0	114.5	65.4	506.9	69.2	576.1	36.5	4.9	1.6	43.1
SOUTH DELTA IMPROVEMENTS												
Dredging on Old River; one Operable Fish Barrier and three Flow Barriers	41.5	8.3	49.8	17.4	10.0	77.2	10.5	87.7	5.6	0.7	0.2	6.6
NO Dredging; one Operable Fish Barrier and three Flow Barriers	28.8	5.8	34.6	12.1	6.9	53.6	7.3	60.9	3.9	0.5	0.2	4.8
Setback Levees; one Operable Fish Barrier and South Delta habitat with setback levees from Franks Track to CCFB	142.1	28.4	170.5	59.7	34.1	264.3	36.1	300.4	19.1	2.6	0.9	22.5
One Operable Fish Barrier ONLY	8.9	1.8	10.7	3.7	2.1	16.6	2.3	18.8	1.2	0.2	0.1	1.4
MULTIPLE INTAKES												
Extended version -- Four intakes; Northern (15,000 cfs), Western (15,000 cfs) and Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood	1,961.0	392.2	2,353.2	823.6	470.8	3,647.5	498.2	4,145.7	263.0	35.3	11.8	310.1
ISOLATED FACILITY												
5,000 cfs isolated open channel with a diversion at Hood	522.4	104.5	626.9	219.4	125.4	971.7	132.7	1,104.4	70.1	9.4	3.1	82.6
15,000 cfs isolated open channel with a diversion at Hood	789.7	157.9	947.6	331.7	189.5	1,468.8	200.6	1,669.5	105.9	14.2	4.7	124.9

TABLE E

D-010547

## CALFED Facility Components

(Million of 1996 Dollars)

Facility Component	Base Construction Estimate	Contingency Cost	Construction Cost	Engineering Cost	Regulatory Cost	Subtotal Cost	Forgone Investment Adjustment	TOTAL CAPITAL COST	Annual Capital Cost	Annual O&M Cost	Annual Energy Cost	TOTAL ANNUAL COST
A	B	C	D	E	F	G	H	I	J	K	L	M
		0.2 x B	B + C	0.35 x D	0.2 x D	D + E + F	G + H	0.0634 x I	0.015 x D	0.005 x D	J + K + L	
<b>IN DELTA STORAGE</b>												
Flooding of Victoria, Woodward, and Bacon Islands with siphons used to convey water through interior canals	540.8	108.2	649.0	227.1	129.8	1,005.9	137.4	1,143.3	72.5	9.7	3.2	85.5
<b>GROUNDWATER STORAGE</b>												
<b>NORTH OF DELTA</b>												
250 TAF Sacramento Valley Projects	30.0	6.0	36.0	12.6	7.2	55.8	1.7	57.5	3.6	0.5	0.2	4.4
280 TAF Eastern Sutter Co. Project @ \$125/AF	35.0	7.0	42.0	14.7	8.4	65.1	2.0	67.1	4.3	0.6	0.2	5.1
220 TAF Thomas Creek Fan Project @ \$128/AF	28.2	5.6	33.8	11.8	6.8	52.4	1.6	53.9	3.4	0.5	0.2	4.1
280 TAF Yuba Co. Project @ \$111/AF	31.1	6.2	37.3	13.1	7.5	57.8	1.7	59.5	3.8	0.6	0.2	4.5
<b>SOUTH OF DELTA</b>												
500 TAF San Joaquin Valley Projects	72.5	14.5	87.0	30.5	17.4	134.9	4.0	138.9	8.8	1.3	0.4	10.6
930 TAF Kern River Fan Project @ \$134/AF	124.6	24.9	149.5	52.3	29.9	231.8	7.0	238.7	15.1	2.2	0.7	18.1
350 TAF Madera Ranch Project @ \$171/AF	59.9	12.0	71.8	25.1	14.4	111.3	3.3	114.7	7.3	1.1	0.4	8.7
740 TAF Folsom South Canal Area Project @ \$140/AF	103.6	20.7	124.3	43.5	24.9	192.7	5.8	198.5	12.6	1.9	0.6	15.1

TABLE E

## **APPENDIX F**

### **"REPRESENTATIVE" STORAGE FACILITIES COSTS**

**REPRESENTATIVE STORAGE FACILITIES**

<b>DESCRIPTION</b>	<b>PAGE</b>
Representative Surface Storage Costs	<b>F 1</b>
Representative Groundwater Storage Costs	<b>D 2.1</b>

**TABLE F**

## REPRESENTATIVE SURFACE STORAGE COSTS

	Storage Capacity (TAF)	Total Capital Cost (\$ million)	Total Annual Cost (\$ million)
<b>SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE</b>			
<b>Red Bank Project</b>	350	280	21
<b>Large Sites Reservoir</b>	1900	941	70
Tehama-Colusa Enlarg. (Enlarge existing canal Reaches 1-5, pumping/screened intake) (2a2)	454	34	
Chico Landing Intertie	484	37	
Total:	<b>2250</b>	<b>2160</b>	<b>163</b>
\$/af:	960	72	
<b>Thomes-Newville Reservoir Complex</b>	1800	1976	148
<b>Small Sites Reservoir</b>	1200	654	49
Tehama-Colusa Enlarg. (Enlarge existing canal Reaches 1-5, pumping/screened intake) (2a2)	454	34	
Total:	<b>3000</b>	<b>3084</b>	<b>231</b>
\$/af:	1028	77	
<b>Thomes-Newville Reservoir Complex</b>	1800	1976	148
Tehama-Colusa Enlarg. (Enlarge existing canal Reaches 1-2, pumping/screened intake) (2e2)	319	24	
<b>Red Bank Project</b>	350	280	21
Total:	<b>2150</b>	<b>2575</b>	<b>193</b>
\$/af:	1198	90	
<b>Colusa Reservoir Complex</b>	3300	1938	145
Tehama-Colusa Enlarg. (Enlarge existing canal Reaches 1-5, pumping/screened intake) (2a2)	454	34	
\$/af:	2075	155	
Total:	<b>3300</b>	<b>2392</b>	<b>179</b>
AVERAGE:	<b>2675</b>	<b>2553</b>	<b>192</b>
\$/af:	954	72	
<b>3.0 MAF DEVELOPMENT:</b>	<b>2863</b>	<b>215</b>	

## SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

Montgomery Reservoir	<b>240 TAF DEVELOPMENT:</b>	<b>330</b>	<b>25</b>
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## OFF-AQUEDUCT SURFACE STORAGE

Los Banos Grandes Los Vaqueros Reservoir Enlargement	2000 1100	1727 2376	129 178
AVERAGE:	1550	2051	153
<b>1.0 MAF DEVELOPMENT:</b>	<b>1324</b>	<b>99</b>	
		1324	99
<b>2.0 MAF DEVELOPMENT:</b>	<b>2647</b>	<b>198</b>	

## APPENDIX F 1

## REPRESENTATIVE GROUNDWATER STORAGE COSTS

	Active Storage Capacity (taf)	Total Capital Cost (\$ million)	Total Annual Cost (\$ million)
<b>250 TAF NORTH OF DELTA GROUNDWATER STORAGE</b>			
Eastern Sutter Co	280	67.1	5.1
\$/af:		239.5	18.2
Thomes Creek Fan	220	53.9	4.1
\$/af:		245.2	18.6
Yuba County	280	59.5	4.5
\$/af:		212.7	16.2
AVERAGE:	260	60.2	4.6
\$/af:		231.5	17.7
<b>250 TAF DEVELOPMEMT:</b>	<b>250</b>	<b>57.9</b>	<b>4.4</b>

## 500 TAF SOUTH OF DELTA GROUNDWATER STORAGE

Kern River Fan	930	238.7	18.1
\$/af:		256.7	19.5
Madera Ranch	350	114.7	8.7
\$/af:		327.6	24.9
Folsom South Canal Area	740	198.5	15.1
\$/af:		268.2	20.4
AVERAGE:	673	184.0	14.0
\$/af:		273.2	20.8
<b>500 TAF DEVELOPMEMT:</b>	<b>500</b>	<b>136.6</b>	<b>10.4</b>

## **APPENDIX G**

### **ALTERNATIVE COST SUMMARY**

## ALTERNATIVE COST SUMMARY

<u>CALFED ALTERNATIVE</u>	<u>STORAGE</u>		<u>DELTA CONVEYANCE</u>		<u>COMMON PROGRAMS</u>		<u>TOTAL CAPITAL COST</u>  (\$ Million)	<u>TOTAL ANNUAL COST</u>  (Includes Capital Repayment, Energy Cost, and O&M)  (\$ Million)
	CAPITAL COST (\$ Million)	ANNUAL COST (\$ Million)	CAPITAL COST (\$ Million)	ANNUAL COST (\$ Million)	CAPITAL COST (\$ Million)	ANNUAL COST (\$ Million)		
					\$4,000	\$133	\$4,000	\$133
<b>1A</b>					\$4,000	\$133	<b>\$4,000</b>	<b>\$133</b>
<b>1B</b>			\$430	\$32	\$4,000	\$133	<b>\$4,430</b>	<b>\$165</b>
<b>1C</b>	<b>\$4,383</b>	<b>\$329</b>	<b>\$482</b>	<b>\$36</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$8,865</b>	<b>\$498</b>
<b>2A</b>			\$1,413	\$106	\$4,000	\$133	<b>\$5,413</b>	<b>\$239</b>
<b>2B</b>	<b>\$6,036</b>	<b>\$452</b>	<b>\$1,413</b>	<b>\$106</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$11,449</b>	<b>\$691</b>
<b>2D</b>	<b>\$2,647</b>	<b>\$198</b>	<b>\$1,899</b>	<b>\$142</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$8,546</b>	<b>\$473</b>
<b>2E</b>	<b>\$6,036</b>	<b>\$452</b>	<b>\$1,271</b>	<b>\$95</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$11,307</b>	<b>\$681</b>
<b>3A</b>			\$1,905	\$143	\$4,000	\$133	<b>\$5,905</b>	<b>\$276</b>
<b>3B</b>	<b>\$7,179</b>	<b>\$538</b>	<b>\$1,905</b>	<b>\$143</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$13,084</b>	<b>\$814</b>
<b>3E</b>	<b>\$7,179</b>	<b>\$538</b>	<b>\$2,401</b>	<b>\$180</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$13,580</b>	<b>\$851</b>
<b>3H</b>	<b>\$6,036</b>	<b>\$452</b>	<b>\$2,375</b>	<b>\$178</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$12,411</b>	<b>\$763</b>
<b>3I</b>	<b>\$6,304</b>	<b>\$473</b>	<b>\$4,540</b>	<b>\$340</b>	<b>\$4,000</b>	<b>\$133</b>	<b>\$14,844</b>	<b>\$945</b>

TABLE G

**ALTERNATIVE 1A****COMPONENTS:**

	TOTAL CAPITAL COST <small>(\$ Million)</small>	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small> <small>(\$ Million)</small>
<b><u>COMMON PROGRAMS</u></b>		
WATER QUALITY AND UPPER WATERSHED MANAGEMENT	750	25
ECOSYSTEM RESTORATION	1,500	50
WATER USE EFFICIENCY AND WATER TRANSFERS	750	25
LEVEE SYSTEM INTEGRITY	1,000	33
<b>SUBTOTAL COMMON PROGRAMS</b>	<b>4,000</b>	<b>133</b>
<b>TOTAL PROGRAM COST -- ALTERNATIVE 1A</b>	<b>4,000</b>	<b>133</b>
<i>RANGE</i>		
LOW (-10%)	3,600	120
HIGH (+15%)	4,600	153

**ALTERNATIVE 1B****COMPONENTS:**

	TOTAL CAPITAL COST <small>(\$ Million)</small>	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small> <small>(\$ Million)</small>
<b><u>DELTA CONVEYANCE</u></b>		
<b>SOUTH DELTA IMPROVEMENTS</b>		
* South Delta Improvements with NO Dredging including Operable Fish Barrier, and three Flow Barriers	61	5
<b>CVP - SWP IMPROVEMENTS</b>		
* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, and an Intertie for Tracy and CCFB	369	28
<b><u>SUBTOTAL DELTA CONVEYANCE</u></b>		<b>430</b>
<b><u>SUBTOTAL DELTA CONVEYANCE</u></b>		<b>32</b>
<b><u>COMMON PROGRAMS</u></b>		
WATER QUALITY AND UPPER WATERSHED MANAGEMENT	750	25
ECOSYSTEM RESTORATION	1,500	50
WATER USE EFFICIENCY AND WATER TRANSFERS	750	25
LEVEE SYSTEM INTEGRITY	1,000	33
<b><u>SUBTOTAL COMMON PROGRAMS</u></b>		<b>4,000</b>
<b><u>TOTAL PROGRAM COST – ALTERNATIVE 1B</u></b>		<b>4,430</b>
<i>RANGE</i>		
LOW (-10%)		
3,987		
HIGH (+15%)		
5,094		
149		
190		

## ALTERNATIVE 1C

### **COMPONENTS:**

#### **STORAGE**

##### **NORTH OF DELTA GROUND WATER STORAGE**

\* 250 TAF Sacramento Valley Projects

	<b>TOTAL CAPITAL COST</b>	<b>TOTAL ANNUAL COST</b>	
		<b>(\$ Million)</b>	<b>(\$ Million)</b>

57 4

##### **SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE**

3.0 MAF Surface Storage in Sacramento Valley

Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomes-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomes-Newville + .350 MAF Red Bank

2,863 215

##### **SOUTH OF DELTA GROUND WATER STORAGE**

\* 500 TAF San Joaquin Valley Projects

139 11

##### **SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE**

1.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement

1,324 99

**SUBTOTAL STORAGE** 4,383 329

#### **DELTA CONVEYANCE**

##### **SOUTH DELTA IMPROVEMENTS**

\* South Delta Improvements, typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers

88 7

##### **CVP - SWP IMPROVEMENTS**

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394 30

**SUBTOTAL DELTA CONVEYANCE** 482 36

#### **COMMON PROGRAMS**

##### **WATER QUALITY AND UPPER WATERSHED MANAGEMENT**

750 25

##### **ECOSYSTEM RESTORATION**

1,500 50

##### **WATER USE EFFICIENCY AND WATER TRANSFERS**

750 25

##### **LEVEE SYSTEM INTEGRITY**

1,000 33

**SUBTOTAL COMMON PROGRAMS** 4,000 133

**TOTAL PROGRAM COST -- ALTERNATIVE 1C** 8,865 498

<i>RANGE</i>			
LOW (-10%)	7,978		448
HIGH (+15%)	10,194		573

## ALTERNATIVE 2A

### **COMPONENTS:**

	TOTAL CAPITAL COST	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>
	(\$ Million)	(\$ Million)
<b><u>DELTA CONVEYANCE</u></b>		
<b>NORTH DELTA IMPROVEMENTS</b>		
* North Delta Improvements with a 10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin	931	70
<b>SOUTH DELTA IMPROVEMENTS</b>		
* South Delta Improvements, typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers	88	7
<b>CVP - SWP IMPROVEMENTS</b>		
* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB	394	30
<b>SUBTOTAL DELTA CONVEYANCE</b>		<b>1,413</b>
<b>106</b>		
<b><u>COMMON PROGRAMS</u></b>		
WATER QUALITY AND UPPER WATERSHED MANAGEMENT	750	25
ECOSYSTEM RESTORATION	1,500	50
WATER USE EFFICIENCY AND WATER TRANSFERS	750	25
LEVEE SYSTEM INTEGRITY	1,000	33
<b>SUBTOTAL COMMON PROGRAMS</b>		<b>4,000</b>
<b>133</b>		
<b>TOTAL PROGRAM COST -- ALTERNATIVE 2A</b>		<b>5,413</b>
<i>RANGE</i>		
LOW (-10%)		
4,872		
HIGH (+15%)		
6,225		
215		
275		

## ALTERNATIVE 2B

### **COMPONENTS:**

	TOTAL CAPITAL COST	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>
<b>NORTH OF DELTA GROUND WATER STORAGE</b> * 250 TAF Sacramento Valley Projects	57	4
<b>SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE</b> 3.0 MAF Surface Storage in Sacramento Valley Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomas-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomas-Newville + .350 MAF Red Bank	2,863	215
<b>SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE</b> 240 TAF Surface Storage in San Joaquin Valley Montgomery Reservoir -- Cost Basis: Cost of 240 TAF	330	25
<b>SOUTH OF DELTA GROUND WATER STORAGE</b> * 500 TAF San Joaquin Valley Projects	139	11
<b>SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE</b> 2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement	2,647	198
<b><u>SUBTOTAL STORAGE</u></b>	<b>6,036</b>	<b>452</b>

### **DELTA CONVEYANCE**

<b>NORTH DELTA IMPROVEMENTS</b> * North Delta Improvements with a 10,000 cfs Hood Diversion, flooded McCormick Williamson, and setback levees New Hope, Staten/Tyler, and Bouldin	931	70
<b>SOUTH DELTA IMPROVEMENTS</b> * South Delta Improvements, typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers	88	7
<b>CVP - SWP IMPROVEMENTS</b> * CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intetie for Tracy and CCFB	394	30
<b><u>SUBTOTAL DELTA CONVEYANCE</u></b>	<b>1,413</b>	<b>106</b>

### **COMMON PROGRAMS**

<b>WATER QUALITY AND UPPER WATERSHED MANAGEMENT</b>	750	25
<b>ECOSYSTEM RESTORATION</b>	1,500	50
<b>WATER USE EFFICIENCY AND WATER TRANSFERS</b>	750	25
<b>LEVEE SYSTEM INTEGRITY</b>	1,000	33
<b><u>SUBTOTAL COMMON PROGRAMS</u></b>	<b>4,000</b>	<b>133</b>

<b>TOTAL PROGRAM COST - ALTERNATIVE 2B</b>	<b>11,449</b>	<b>691</b>
<i>RANGE</i>		
LOW (-10%)	10,304	622
HIGH (+15%)	13,166	795

## ALTERNATIVE 2D

### **COMPONENTS:**

#### STORAGE

##### SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.)  
2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement

	TOTAL CAPITAL COST	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>
	(\$ Million)	(\$ Million)
	2,647	198
<b><u>SUBTOTAL STORAGE</u></b>	<b>2,647</b>	<b>198</b>

#### DELTA CONVEYANCE

##### NORTH DELTA IMPROVEMENTS

\* North Delta Improvements with East Floodway, includes diversion at Hood, flooded McCormick Williamson, Canal Ranch, Brack, Bouldin, and setback levees on New Hope, Terminous and Staten

1,204 90

##### SOUTH DELTA IMPROVEMENTS

\* South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

300 22

##### CVP - SWP IMPROVEMENTS

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394 30

**SUBTOTAL DELTA CONVEYANCE** 1,899 142

#### COMMON PROGRAMS

##### WATER QUALITY AND UPPER WATERSHED MANAGEMENT

750 25

##### ECOSYSTEM RESTORATION

1,500 50

##### WATER USE EFFICIENCY AND WATER TRANSFERS

750 25

##### LEVEE SYSTEM INTEGRITY

1,000 33

**SUBTOTAL COMMON PROGRAMS** 4,000 133

**TOTAL PROGRAM COST -- ALTERNATIVE 2D** 8,546 473

<i>RANGE</i>		
LOW (-10%)	7,691	426
HIGH (+15%)	9,828	544

**ALTERNATIVE 2E****COMPONENTS:****STORAGE**

## NORTH OF DELTA GROUND WATER STORAGE

\* 250 TAF Sacramento Valley Projects

TOTAL CAPITAL COST (\$ Million)	TOTAL ANNUAL COST (Includes Capital Repayment, Energy Cost, and O&M) (\$ Million)
------------------------------------	-----------------------------------------------------------------------------------------

57 4

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

3.0 MAF Surface Storage in Sacramento Valley

Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomes-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomes-Newville + .350 MAF Red Bank

2,863 215

## SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

240 TAF Surface Storage in San Joaquin Valley -- Cost Basis: Cost of 240 TAF Montgomery Reservoir

330 25

## SOUTH OF DELTA GROUND WATER STORAGE

\* 500 TAF San Joaquin Valley Projects

139 11

## SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement

2,647 198

**SUBTOTAL STORAGE** 6,036 452**DELTA CONVEYANCE**

## NORTH DELTA IMPROVEMENTS

\* North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

576 43

## SOUTH DELTA IMPROVEMENTS

\* South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

300 22

## CVP - SWP IMPROVEMENTS

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394 30

**SUBTOTAL DELTA CONVEYANCE** 1,271 95**COMMON PROGRAMS**

## WATER QUALITY AND UPPER WATERSHED MANAGEMENT

750 25

## ECOSYSTEM RESTORATION

1,500 50

## WATER USE EFFICIENCY AND WATER TRANSFERS

750 25

## LEVEE SYSTEM INTEGRITY

1,000 33

**SUBTOTAL COMMON PROGRAMS** 4,000 133**TOTAL PROGRAM COST -- ALTERNATIVE 2E** 11,307 681

RANGE	LOW (-10%)	HIGH (+15%)
LOW (-10%)	10,176	613
HIGH (+15%)	13,003	783

## ALTERNATIVE 3A

### **COMPONENTS:**

	TOTAL CAPITAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>
	(\$ Million)	(\$ Million)
<b><u>DELTA CONVEYANCE</u></b>		
ISOLATED FACILITY * 5,000 cfs Isolated Open Channel Facility with a diversion at Hood	1,104	83
NORTH DELTA IMPROVEMENTS * North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin	318	24
SOUTH DELTA IMPROVEMENTS * South Delta Improvements, typical, Including dredging on Old River, one Operable Fish Barrier and three Flow Barriers	88	7
CVP - SWP IMPROVEMENTS * CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intetie for Tracy and CCFB	394	30
<b>SUBTOTAL DELTA CONVEYANCE</b>	<b>1,905</b>	<b>143</b>
<b><u>COMMON PROGRAMS</u></b>		
WATER QUALITY AND UPPER WATERSHED MANAGEMENT	750	25
ECOSYSTEM RESTORATION	1,500	50
WATER USE EFFICIENCY AND WATER TRANSFERS	750	25
LEVEE SYSTEM INTEGRITY	1,000	33
<b>SUBTOTAL COMMON PROGRAMS</b>	<b>4,000</b>	<b>133</b>
<b>TOTAL PROGRAM COST – ALTERNATIVE 3A</b>	<b>5,905</b>	<b>276</b>
<i>RANGE</i>		
LOW (-10%)	5,314	248
HIGH (+15%)	6,790	317

**ALTERNATIVE 3B****COMPONENTS:****STORAGE****NORTH OF DELTA GROUND WATER STORAGE**

\* 250 TAF Sacramento Valley Projects

TOTAL CAPITAL COST	TOTAL ANNUAL COST (Includes Capital Repayment, Energy Cost, and O&M)
(\$ Million)	(\$ Million)

57 4

**SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE**

3.0 MAF Surface Storage in Sacramento Valley

Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomas-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomas-Newville + .350 MAF Red Bank

2,863 215

**SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE**

\* 240 TAF Surface Storage in San Joaquin Valley -- Cost Basis: Cost of 240 TAF Montgomery Reservoir

330 25

**IN-DELTA STORAGE**

\* In-Delta Storage typical with flooding of Victoria, Woodward and Bacon Islands, syphons used to convey water through interior canals

1,143 86

**SOUTH OF DELTA GROUND WATER STORAGE**

\* 500 TAF San Joaquin Valley Projects

139 11

**SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE**

2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes;

2.) 1.1 MAF Los Vaqueros Enlargement

2,647 198

**SUBTOTAL STORAGE** 7,179 538**DELTA CONVEYANCE****ISOLATED FACILITY**

\* 5,000 cfs Isolated Open Channel Facility with a diversion at Hood

1,104 83

**NORTH DELTA IMPROVEMENTS**

\* North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin

318 24

**SOUTH DELTA IMPROVEMENTS**

\* South Delta Improvements, typical, including dredging on Old River, one Operable Fish Barrier and three Flow Barriers

88 7

**CVP - SWP IMPROVEMENTS**

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394 30

**SUBTOTAL DELTA CONVEYANCE** 1,905 143**COMMON PROGRAMS****WATER QUALITY AND UPPER WATERSHED MANAGEMENT**

750 25

**ECOSYSTEM RESTORATION**

1,500 50

**WATER USE EFFICIENCY AND WATER TRANSFERS**

750 25

**LEVEE SYSTEM INTEGRITY**

1,000 33

**SUBTOTAL COMMON PROGRAMS** 4,000 133**TOTAL PROGRAM COST -- ALTERNATIVE 3B** 13,084 814

RANGE	LOW (-10%)	HIGH (+15%)
	11,778	732
	15,047	936

**ALTERNATIVE 3E****COMPONENTS:****STORAGE**

	TOTAL CAPITAL COST	TOTAL ANNUAL COST (Includes Capital Repayment, Energy Cost, and O&M)
	(\$ Million)	(\$ Million)
NORTH OF DELTA GROUND WATER STORAGE * 250 TAF Sacramento Valley Projects	57	4
SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE 3.0 MAF Surface Storage in Sacramento Valley Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomas-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomas-Newville + .350 MAF Red Bank	2,863	215
SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE * 240 TAF Surface Storage in San Joaquin Valley -- Cost Basis: Cost of 240 TAF Montgomery Reservoir	330	25
IN-DELTA STORAGE * In-Delta Storage typical with flooding of Victoria, Woodward and Bacon Islands, syphons used to convey water through interior canals	1,143	86
SOUTH OF DELTA GROUND WATER STORAGE * 500 TAF San Joaquin Valley Projects	139	11
SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE 2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement	2,647	198
	<b>SUBTOTAL STORAGE</b>	<b>7,179</b>
	<b>538</b>	

**DELTA CONVEYANCE**

ISOLATED FACILITY * 15,000 cfs Isolated Open Channel Facility with a Diversion at Hood	1,669	125
NORTH DELTA IMPROVEMENTS * North Delta Improvements with Setback Levees at New Hope, Staten/Tyler, and Bouldin	318	24
SOUTH DELTA IMPROVEMENTS * South Delta Improvements with one Operable Fish Barrier ONLY	19	1
CVP - SWP IMPROVEMENTS * CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB	394	30
	<b>SUBTOTAL DELTA CONVEYANCE</b>	<b>2,401</b>
	<b>180</b>	

**COMMON PROGRAMS**

WATER QUALITY AND UPPER WATERSHED MANAGEMENT	750	25
ECOSYSTEM RESTORATION	1,500	50
WATER USE EFFICIENCY AND WATER TRANSFERS	750	25
LEVEE SYSTEM INTEGRITY	1,000	33
	<b>SUBTOTAL COMMON PROGRAMS</b>	<b>4,000</b>
	<b>133</b>	

TOTAL PROGRAM COST -- ALTERNATIVE 3E	13,580	851
<i>RANGE</i>		
LOW (-10%)	12,222	766
HIGH (+15%)	15,617	979

ALTERNATIVE 3H**COMPONENTS:****STORAGE**

## NORTH OF DELTA GROUND WATER STORAGE

\* 250 TAF Sacramento Valley Projects

TOTAL CAPITAL COST (\$ Million)	TOTAL ANNUAL COST (\$ Million)
<i>(Includes Capital Repayment, Energy Cost, and O&amp;M)</i>	

57 4

## SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

3.0 MAF Surface Storage in Sacramento Valley

Cost Basis – Average Cost of the following 4 projects – 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank;  
3) 1.8 MAF Thomes-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomes-Newville + .350 MAF Red Bank

2,863 215

## SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

# 240 TAF Surface Storage in San Joaquin Valley

– Cost Basis: Cost of 240 TAF Montgomery Reservoir

330 25

## SOUTH OF DELTA GROUND WATER STORAGE

\* 500 TAF San Joaquin Valley Projects

139 11

## SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

2.0 MAF Off-Aqueduct Surface Storage – Cost Basis – Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement

2,647 198

**SUBTOTAL STORAGE** 6,036 452**DELTA CONVEYANCE**

## ISOLATED FACILITY

\* 5,000 cfs Isolated Open Channel Facility with a diversion at Hood

1,104 83

## NORTH DELTA IMPROVEMENTS

\* North Delta Improvements with West Floodway, includes weir intake, flooded McCormick Williamson, Tyler, and Bouldin Islands, and east Delta habitat on Canal Ranch and Brack

576 43

## SOUTH DELTA IMPROVEMENTS

\* South Delta Improvements with Setback Levees, includes one Operable Fish Barrier and South Delta habitat with setback levees from Rock Slough to CCFB

300 22

## CVP - SWP IMPROVEMENTS

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394 30

**SUBTOTAL DELTA CONVEYANCE** 2,375 178**COMMON PROGRAMS**

## WATER QUALITY AND UPPER WATERSHED MANAGEMENT

750 25

## ECOSYSTEM RESTORATION

1,500 50

## WATER USE EFFICIENCY AND WATER TRANSFERS

750 25

## LEVEE SYSTEM INTEGRITY

1,000 33

**SUBTOTAL COMMON PROGRAMS** 4,000 133**TOTAL PROGRAM COST – ALTERNATIVE 3H** 12,411 763

RANGE	LOW (-10%)	HIGH (+15%)
	11,170	687
	14,273	878

## ALTERNATIVE 3I

### **COMPONENTS:**

#### **STORAGE**

##### NORTH OF DELTA GROUND WATER STORAGE

\* 250 TAF Sacramento Valley Projects

TOTAL CAPITAL COST	TOTAL ANNUAL COST <small>(Includes Capital Repayment, Energy Cost, and O&amp;M)</small>
(\$ Million)	(\$ Million)

57      4

##### SACRAMENTO RIVER TRIBUTARY SURFACE STORAGE

3.0 MAF Surface Storage in Sacramento Valley

Cost Basis -- Average Cost of the following 4 projects -- 1) 3.3 MAF Colusa; 2) 1.9 MAF Sites + .350 MAF Red Bank; 3) 1.8 MAF Thomes-Newville + 1.2 MAF Sites; 4) 1.8 MAF Thomes-Newville + .350 MAF Red Bank

2,863      215

##### SAN JOAQUIN RIVER TRIBUTARY SURFACE STORAGE

# 240 TAF Surface Storage in San Joaquin Valley -- Cost Basis: Cost of 240 TAF Montgomery Reservoir

330      25

##### IN-DELTA STORAGE

100 TAF Holland Tract

268      20

##### SOUTH OF DELTA GROUND WATER STORAGE

\* 500 TAF San Joaquin Valley Projects

139      11

##### SOUTH OF DELTA OFF-AQUEDUCT SURFACE STORAGE

2.0 MAF Off-Aqueduct Surface Storage -- Cost Basis -- Average Cost of Following 2 Projects: 1.) 2.0 MAF Los Grandes; 2.) 1.1 MAF Los Vaqueros Enlargement

2,647      198

**SUBTOTAL STORAGE**      6,304      473

#### **DELTA CONVEYANCE**

##### MULTIPLE INTAKE

Multiple Intakes - Extended version, Four intakes, Northern (15,000 cfs), Western (15,000 cfs) and

\* Eastern (5,000 cfs) - the Northern Intake is extended to Hood with a new supplementary intake structure at Hood

4,146      310

##### CVP - SWP IMPROVEMENTS

\* CVP-SWP Improvements including new fish screens at Skinner, new fish screens at Tracy, new intake at CCFB, and an intertie for Tracy and CCFB

394      30

**SUBTOTAL DELTA CONVEYANCE**      4,540      340

#### **COMMON PROGRAMS**

##### WATER QUALITY AND UPPER WATERSHED MANAGEMENT

750      25

##### ECOSYSTEM RESTORATION

1,500      50

##### WATER USE EFFICIENCY AND WATER TRANSFERS

750      25

##### LEVEE SYSTEM INTEGRITY

1,000      33

**SUBTOTAL COMMON PROGRAMS**      4,000      133

**TOTAL PROGRAM COST – ALTERNATIVE 3I**      14,844      945

RANGE			
LOW (-10%)		13,359	851
HIGH (+15%)		17,070	1,087

*Printed by*  
*Department of Water Resources*  
*Reprographics*

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D-010567